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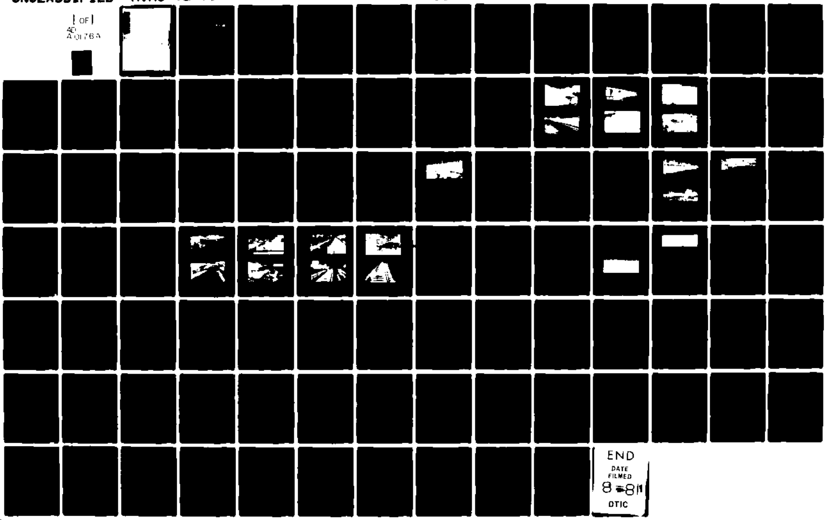

MTMC REPORT TE 79-4-48

RAIL AND MOTOR OUTLOADING CAPABILITY STUDY

CAMP RIPLEY, MINNESOTA

January 1980

Project Engineer

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Traffic Engineering Division

MILITARY TRAFFIC MANAGEMENT COMMAND

TRANSPORTATION ENGINEERING AGENCY

Newport News, Virginia 23606

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EXECUTIVE SUMMARY

1. SCOPE

The Military Traffic Management Command (MTMC) conducted a survey of rail and motor facilities at Camp Ripley, Minnesota, in June 1979, to determine the installation's outloading capability. Rail facilities within 25 miles of Camp Ripley were included in the survey.

2. FINDINGS

The primary finding is that Camp Ripley does not have sufficient rail facilities to meet the current mobilization requirement; consequently, facilities of the Burlington North Railroad (BNRR) will be required for approximately one-half of the requirement. Since the BNRR is planning to abandon their main line track north of Camp Ripley, leaving the main line south to Little Falls for access, the main line track near the entrance to Camp Ripley can be used for loading sites to outload the shortfall.

To transport the equipment of the mobilized 47th Division and support-type units entirely by rail would require 2,058 railcars, with an estimated composition of 1,990 flatcars (1,679 for roadable and 311 for nonroadable equipment) and 68 boxcars[1/]. Since the installation outloading plans were incomplete and no time frame had been established for unit outloading, the analysis in this report is based on a 10-day outloading. During the outloading period no railcar loads of nonroadable equipment are scheduled to arrive.

Camp Ripley has approximately 3 miles of railroad track. The rail trackage is classified as Class 1, according to the Federal Railroad Administration track safety standards, and needs to be upgraded to Class 2. There are rail facilities in Little Falls, Minnesota, about 9 miles from Camp Ripley, that would be suitable to support Camp Ripley's outloading.

The current rail outloading capability at Camp Ripley is limited by insufficient rail end-loading ramps, the existence of sections of

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1/ Since most flatcars are 57 feet long (coupler-to-coupler, that length is used in this report; to convert to any other length, simply multiply the number of cars by 57 and divide by the desired length in feet.

Class 1 track, and shortages of small handtools, bridgeplates, and blocking and bracing materials. Also lacking for maximum efficient outloading operations are adequately trained blocking and bracing crews as well as completed outloading plans.

The recommended rail outloading plan, Plan 4, would yield 206 railcar loads per 24-hour period (106 from Camp Ripley and 100 from the BNRR main line near Camp Ripley). Other options, producing railcar loads of 49, 99, 156 (all equipment), and 106 (nonroadable equipment only), are presented in this study. Plan 4 satisfies the requirement to outload all equipment of the division and supporting units within approximately 10 days.

A survey of loading ramps/docks and other equipment suitable for loading semitrailers revealed that, although the actual availability of semitrailers cannot be predetermined, the motor outloading capability of Camp Ripley exceeds the probable supply of available commercial trailers.

Table 1 shows the current and potential outloading capabilities (both rail and motor) of Camp Ripley.

3. CONCLUSIONS

a. The BNRR currently plans to abandon their main line track north of Camp Ripley Junction; 6,400 feet of this main line track, north of the north switch of the Camp Ripley wye, is needed for mobilization requirements. (Arrangements have been completed by MTMC and BNRR to retain the needed trackage.)

b. Most of Camp Ripley's railroad trackage is classified as Class 1[2/], according to federal track safety standards. Minor maintenance on deficient sections would upgrade all trackage to a Class 2 condition.

c. Other constraints limiting Camp Ripley's rail outloading capability are a shortage of blocking and bracing materials, small handtools, and bridgeplates; insufficient trained blocking and bracing crews; and a lack of outloading plans.

[2/] AR 420-72, 24 March 1976, *Surfaced Areas, Railroads, and Associated Structures*, para 3-15a, states that track on military installations will be maintained to the minimum track safety standards required for Class 2, as outlined in the current Department of Transportation Federal Railway Administration Track Safety Standards (app A).

TABLE 1
RAIL AND MOTOR OUTLOADING CAPABILITY

Rail				
Rate	Number and Type of Railcars (57-ft Length, Coupler-to-Coupler)			Current Constraints
	Flatcars	Boxcars	Total Outloading	
Daily Current	6	3	9	Lack of personnel
Daily Mobilize	218	11	229[a]	Lack of blocking and bracing materials, small handtools, bridgeplates, outloading plans, trained blocking and bracing crews, end-loading ramps.[b]
Plan 4	199[b]	7	206[b]	Same--(track maintenance. 1 concrete and 2 portable timber end ramps $15,000, or 3 timber ramps $7,500)
Nonroadable equipment only	99	7	106	Same--(track maintenance. 1 concrete end ramp $10,000 or 1 timber ramp $2,500.)
Motor				
Rate	Number of Trailers at Available Facilities			Current Constraints
	Flats	Van Semi-trailers	Total Outloading	
Daily Current:				
Concurrent (with rail operation)	6	4	10	Limited by personnel
Separate (without rail operation)	6	4	10	
Daily Mobilize:				
Concurrent (with rail operation)	50[c]	32[e]	82	Van loading - forklift trucks and side loading docks at warehouses
Separate (without rail operation)	110[d]	32[e]	142	

[a] At Little Falls classification yard, 9 miles distant; includes two short spurs south side and TOFC track, 19 flatcars and four boxcars at side-loading ramp, see figure 2.
[b] Blocking and bracing materials not stocked.
[c] With existing usable end-loading ramps.
[d] Using all of c above plus all potential rail end-loading ramps.
[e] Using hand labor in trucks, except for one loading position, since only one side-loading dock exists.

d. End-loading ramps are needed for the three additional identified loading sites, and side-loading docks will be needed for seven boxcars per day.

e. After the deficiencies noted above are corrected and upon receipt of sufficient railcars to permit full-scale outloading, Camp Ripley could outload 106 railcars per 24-hour period. However, to meet the total requirement, 100 railcars will need to be outloaded per 24-hour period on the BNRR main line at Camp Ripley.

f. Empty railcars (dedicated train lengths) destined for Camp Ripley should be positioned in train-loading sequence in Little Falls.

g. Camp Ripley's transportation personnel should coordinate planning of impending outloading operations with the BNRR representatives at the earliest possible date.

h. For administrative-type moves, when leadtime is plentiful and costs must be considered, special-purpose railcars (such as bilevel autoracks, trailer-on-flatcar (TOFC), and container-on-flatcar (COFC)) are more cost-effective than the standard types and should be used to the extent they are available.

i. For mobilization moves, when time is more critical than cost, the use of special-purpose railcars may not be possible because of the short leadtime and relatively short supply of these high-demand cars.

j. Motor outloading is not a good alternative to rail because Camp Ripley is more than 800 miles from any POE.

k. For concurrent rail and motor operations, 50 flatbed and 32 van semitrailers could be loaded per 10-hour day (for daylight operations only), and for separate operations, 110 flatbed and 32 van semitrailers could be loaded during the same period. This capability exceeds the probable available supply of semitrailers.

l. The maximum curvature of the railroad tracks is less than 12 degrees. Consequently, any known length of railcar can be used on the installation.

4. RECOMMENDATIONS

a. Use the BNRR main line track near the entrance to Camp Ripley to outload the mobilization shortfall.

b. Undertake those items listed in section II, paragraph D4, "Physical Improvements and Additions." These improvements will provide a rail system capability of 206 railcars per 24-hour day as well as an effective rail system.

c. Prepare a detailed unit outloading plan, using the simulation in appendix B as an example, specifying unit assignments at loadout sites and movement functions.

d. Coordinate rail outloading plans with BNRR representatives at the earliest possible date.

e. Initiate a rail facility maintenance program to insure an effective rail system.

f. Provide advance training for blocking and bracing crews.

g. Station road guards at all railroad crossings during outloading operations, and provide all train crewmen with walkie-talkies to insure a safer and more efficient operation.

h. Keep abreast of BNRR railroad maintenance plans on the main line trackage to Little Falls.

i. Use special-purpose railcars (such as bilevel autoracks for small vehicles, TOFC cars for semitrailers and vans, and COFC cars for MILVANs) for administrative-type moves, and, as available, for mobilization moves.

j. Provide warehousing for blocking and bracing materials and small-tool supplies.

k. Coordinate with MTMC any removal of railroad track that is included in the mobilization outloading plan.

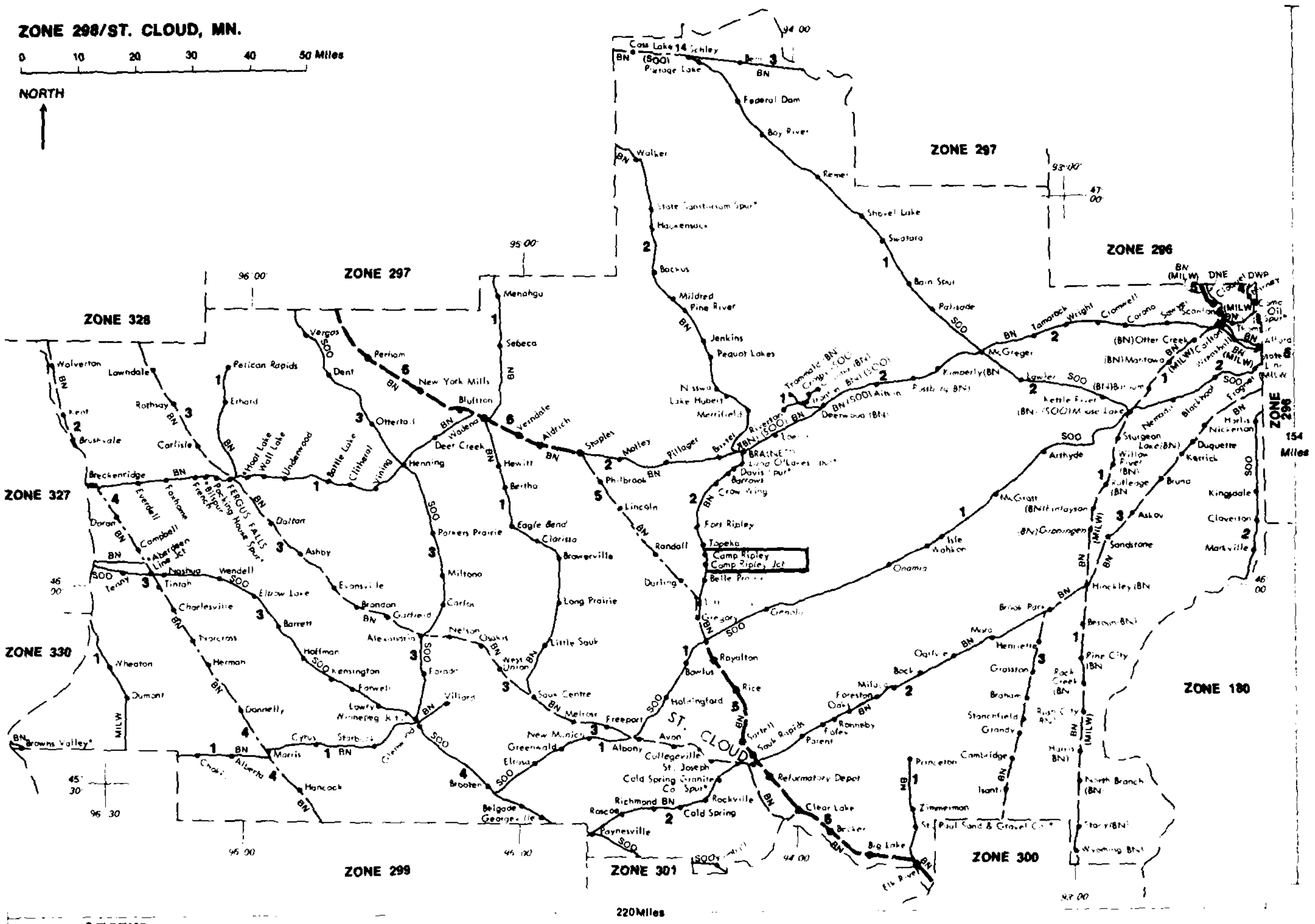
l. Construct any new track with a maximum curvature of 12 degrees.

I. INTRODUCTION

An onsite rail and motor outloading study of Camp Ripley, Minnesota (fig 1), was conducted by the Military Traffic Management Command Transportation Engineering Agency, Newport News, Virginia, during the period 4 through 7 June 1979. The principal objective of the study was to determine the capability of the Camp Ripley rail system to support the deployment of the 47th Division and support-type units. Another objective was to identify any physical improvement, as well as any suitable commercial rail facilities, within Little Falls, Minnesota, that would significantly increase the current capability. This study includes the findings of a Federal Railway Administration (FRA) inspector, who inspected all trackage at Camp Ripley during the onsite study.

The current rail outloading capability of Camp Ripley is limited by a lack of outloading plans and blocking and bracing materials, insufficient small handtools, inadequately trained blocking and bracing crews, and insufficient end-loading ramps. Also, the current rail outloading capability is limited by the condition of some sections of installation rail trackage, classified as less than Class 2. The analysis in this study showed that, if these deficiencies were corrected and rail trackage were upgraded to Class 2, Camp Ripley could support an outloading rate of 106 railcars per 24-hour day; this is not adequate to meet the mobilization requirement of 206 railcars per day. The 100-railcar per day shortfall can be remedied by using the main line track of the Burlington Northern Railroad (BNRR) near the Camp Ripley entrance. With this combined rate, all units required to outload during the peak period could be accommodated within a 10-day period. This study considers options that could produce 49-, 99-, 156-, or 206-railcar loads per 24-hour period and recommends the one with the 206-railcar yield (Plan 4). The nonroadable equipment plan produces 106 railcars per day. Camp Ripley is served by the BNRR from its classification yard in Little Falls, Minnesota.

Motor outloading capability is not a consideration because Camp Ripley is approximately 1,200 miles from a suitable coastal port of embarkation (POE). Findings and recommendations contained in this report are based on analysis of data obtained during the field survey and on other pertinent information relating to installation activities at that time. Any problems incurred in implementing the recommendations should be referred to MTMCTEA for resolution.



LEGEND

BN = Burlington Northern

Figure 1. Camp Ripley and vicinity (reproduced from US Transportation Zone Maps, Department of Transportation, October 1975).

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II. ANALYSIS OF CAMP RIPLEY'S RAIL OUTLOADING FACILITIES

A. GENERAL

Discussions with personnel at Camp Ripley revealed that large-scale rail operations have not occurred there in recent years. Heavy military equipment is moved in and out of the installation by rail, for maintenance purposes or delivery. During the survey period five carloads of construction equipment were received. The BNRR provides switching services, as required, as Camp Ripley has no switch engine or railcrews. Factual data about locomotive operating times and blocking and bracing capabilities were gathered from previous studies.

B. RAIL FACILITY DESCRIPTION

The Camp Ripley rail system, consisting of 3 miles of track, is illustrated in figure 2 and described in table 2. The survey of all sites that could be used for outloading equipment revealed that currently only one site is equipped with an end-loading ramp to load vehicles. This same track has two side-loading ramps with three railcar positions. One other track at Camp Ripley is suitable for end loading vehicles, but an end ramp is needed. A portion of the access line can be used for boxcar loading. Due to limited trackage, facilities of the BNRR are required to meet the peak mobilization requirement. Since the main line of the BNRR at the entrance to Camp Ripley is under study for abandonment, but is suitable for loading sites, it is included in this section of the study for use in the outloading plan.

Most of the trackage at Camp Ripley meets Class 1 standards only. The BNRR track north of Camp Ripley also is Class 1, but the part south of Camp Ripley to Little Falls is Class 2. Camp Ripley does not have rail maintenance personnel; consequently, needed repairs must be accomplished by contract.

The following describes in detail the installation and BNRR sites recommended for loading railcars at Camp Ripley. The proposed loading sites, in descending order of preference, are:

South Spur (L1) is located on the south side of Rosenmeier Avenue. All Camp Ripley rail loading facilities are located along this track. These facilities consist of a concrete end-loading ramp (fig 3), two

side-loading ramps, and one side-loading dock (figs 4 and 5). This spur can be used to end load tracked or other heavy equipment.

North Spur (L2) is located on the north side of Rosenmeier Avenue. This track is suitable for end loading vehicles; however, a permanent or portable end ramp will be required.

East Gate A to East Exchange Road (L3) is a portion of the access line into Camp Ripley. Since, except for one position, there are no side-loading docks on the warehouses along Rosenmeier Avenue, and the tracks there are needed for vehicle loading, this site (fig 6) can be used for boxcar loading. East Gate A (upper center) is closed, and the paved street adjacent to the track provides a good work area for forklift operations.

BNRR Main Line North of Main Gate (L4) extends approximately 6,400 feet north of the north leg of the wye leading into Camp Ripley to provide adequate track for switching long strings of railcars in and out of the installation. Minor site preparation and a portable end ramp will be required to end load vehicles. The site is similar to L5 shown in figures 7 and 8, with Highway 371 parallel and close to the track.

BNRR Main Line at Main Gate (L5) is a portion of the rail access line south to Little Falls (figs 7 and 8). The graveled area between Highway 371 and the railroad track provides good access for vehicles to be end loaded, using a portable ramp. The ramp will have to be removed and replaced after each daily loading cycle.

Access to Camp Ripley's rail system and to the two loading sites on the BNRR main line is good. Vehicles from motor pools and equipment from storage areas can be routed along good asphalt roads to any of the loading sites. This fact, coupled with the potential of the rail system, indicates that Camp Ripley can develop sufficient capability to successfully outload the division within a 10-day time frame.

C. CURRENT PROCEDURES

The BNRR serves Camp Ripley from its facilities in Little Falls, Minnesota. Access is on the east side of Camp Ripley, where the Government-owned track connects with the BNRR track running from Little Falls to Brainerd. Since Camp Ripley does not have any Government-owned locomotives, the BNRR provides all switching services.

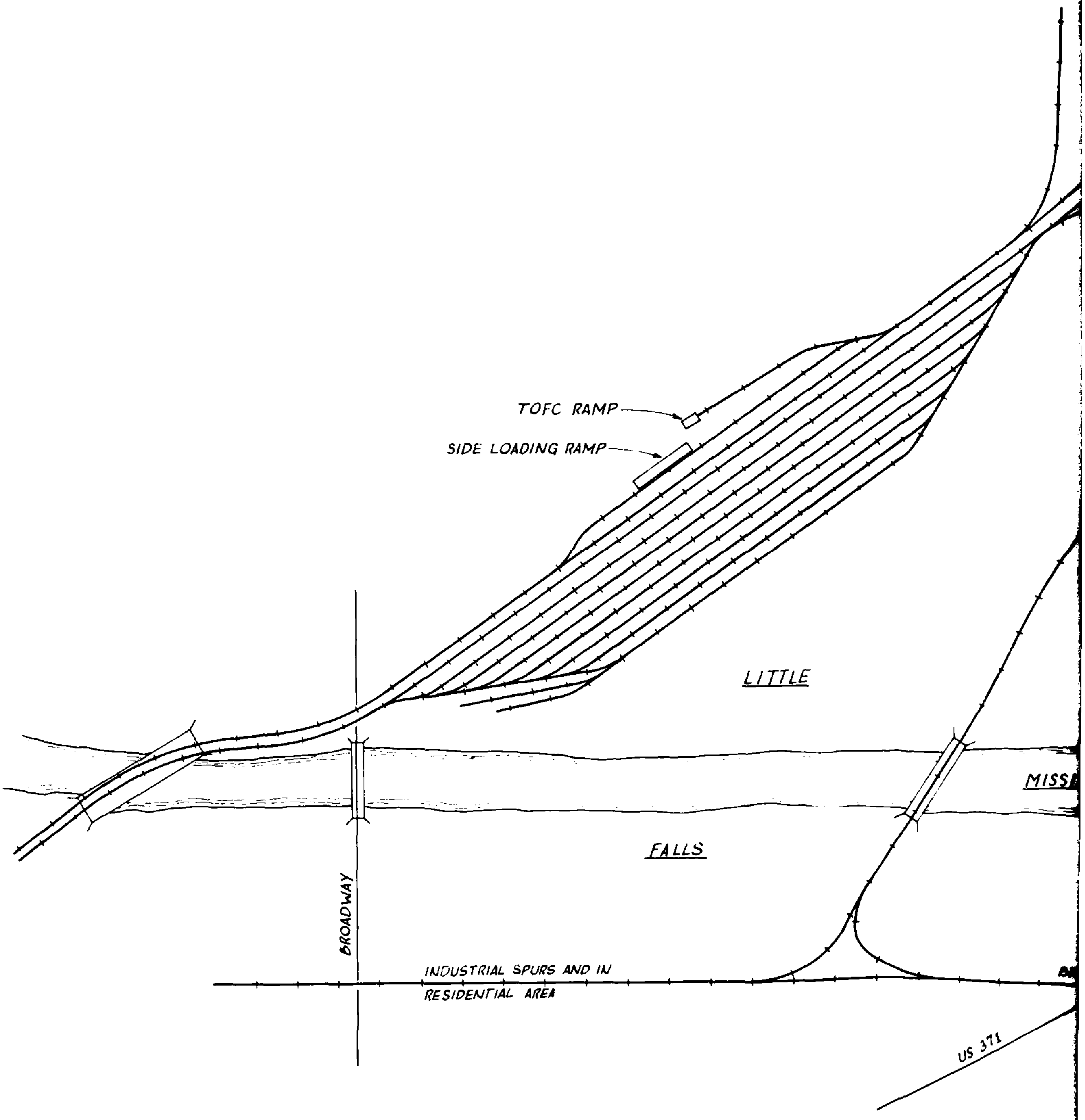
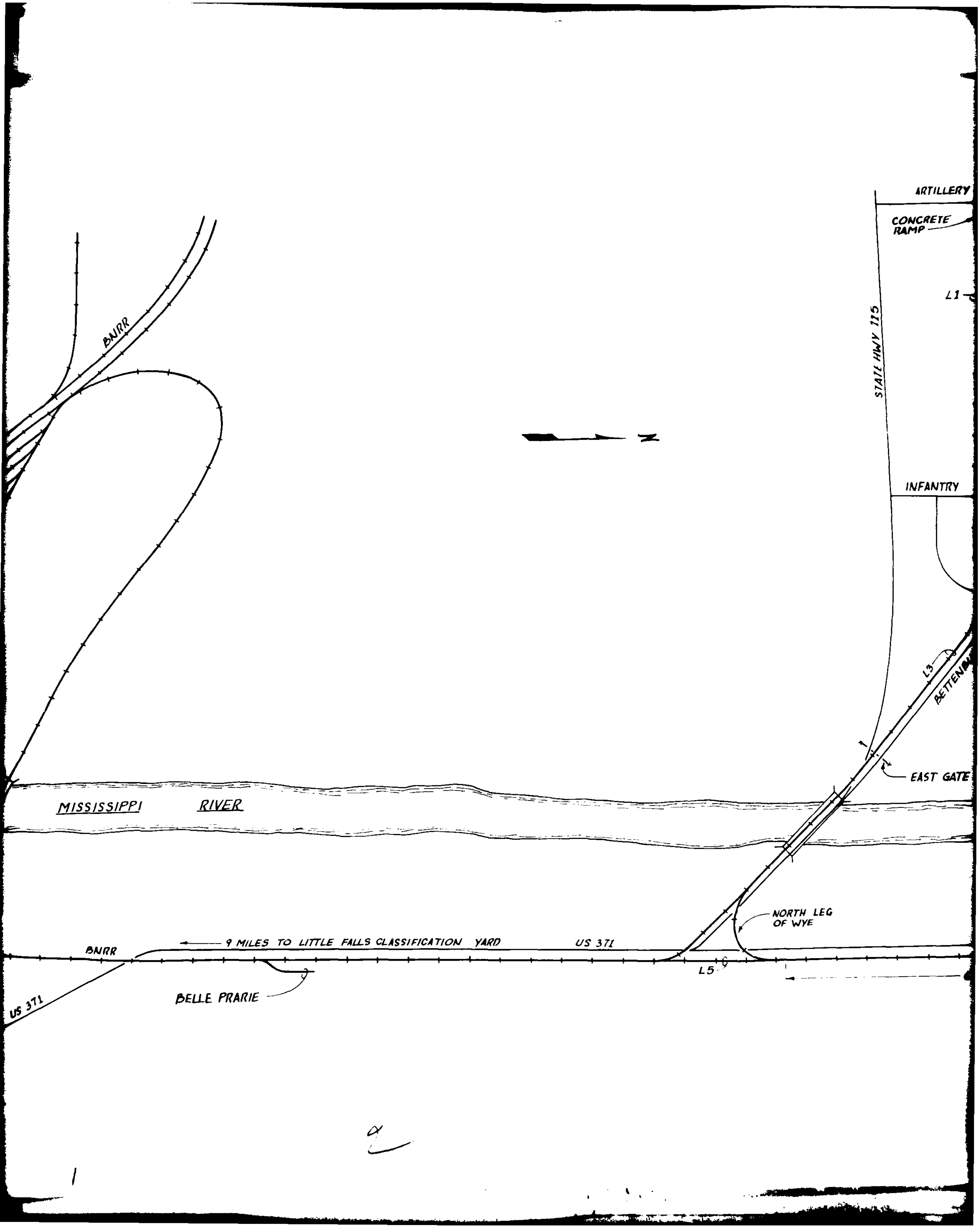
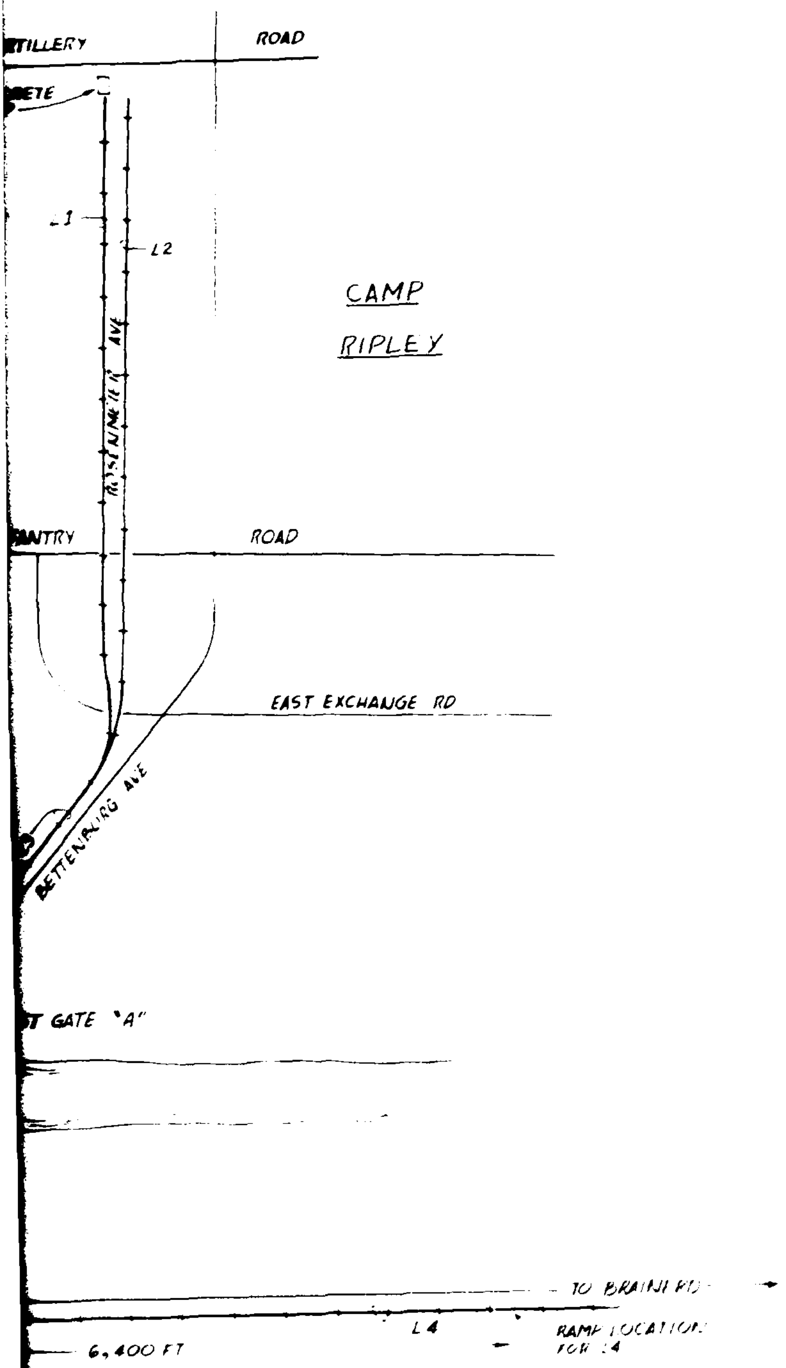


Figure 2. Camp Ripley rail system.


ARTILLERY
CONCRETE RAMP
L1
STATE HWY 115
BNRR
N
INFANTRY
L3
BETTEN
EAST GATE
MISSISSIPPI RIVER
NORTH LEG OF WYE
BNRR
9 MILES TO LITTLE FALLS CLASSIFICATION YARD
US 371
L5
BELLE PRARIE
US 371



TILLERY
ROAD
ETE
L1
L2
CAMP
RIPLEY
ROSENMEIER AVE
NTRY
ROAD
EAST EXCHANGE RD
BETTENBURG AVE
T GATE "A"
TO BRAINERD
L4
RAMP LOCATION
FOR L4
6,400 FT

TABLE 2

CAMP RIPLEY RAIL OUTLOADING FACILITIES

Track and Figure No.	Ramp/Dock	Lighting	Surface Conditions	Staging Area	Railcar Capacity		Access Availability	Priority	Present Condition of Track
					Total Length Feet	Used Length Cars			
South spur L1 (figs 3, 4, and 5)	Concrete end ramp, 2 side loading ramps/ 3 positions for boxcars, 1 side loading dock with 1 position for boxcar	No	Cood	Yes, but streets will be blocked	2,960	49	Good	1 of 5	Class 1, missing joint bar bolts, cracked joint bars, tight and wide gage, brok-en rail.
North spur L2 (fig 3)	None	No	Good	ditto	2,960	50	Good	2 of 5	Class 1, missing joint bar bolts, loose joint, tight gage.
East Gate A to East Exchange Road L3 (fig 6)	None	No	Good	ditto	2,100	7	Good	3 of 5	Class 1, missing joint bar bolts, defective ties, tight gage.
BNRR Main Line North of Main Gate L4 (site similar to figs 7 and 8)	None	No	Good	ditto	6,400	50	Good	4 of 5	Class 1 (detailed inspection not made).
BNRR Main Line at Main Gate L5 (figs 7 and 8)	None	No	Good	Yes, along highway	NA	50	Good	5 of 5	Class 1 (detailed inspection not made).

Figure 3. Tracks L1 (right) and L2 (left), easterly view.

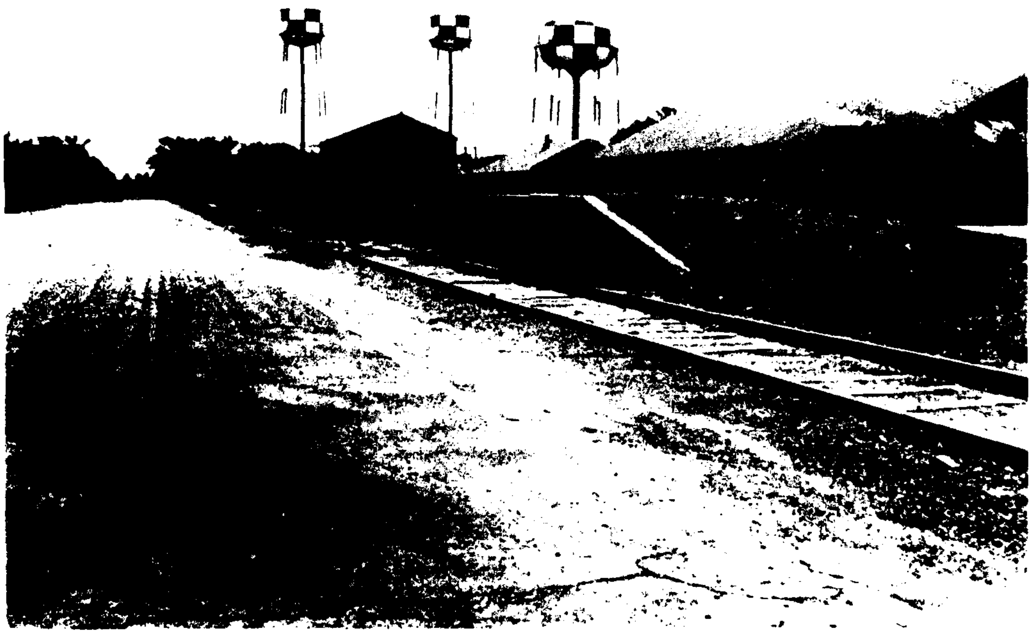


Figure 4. Track L1, side-loading ramp with two boxcar positions.

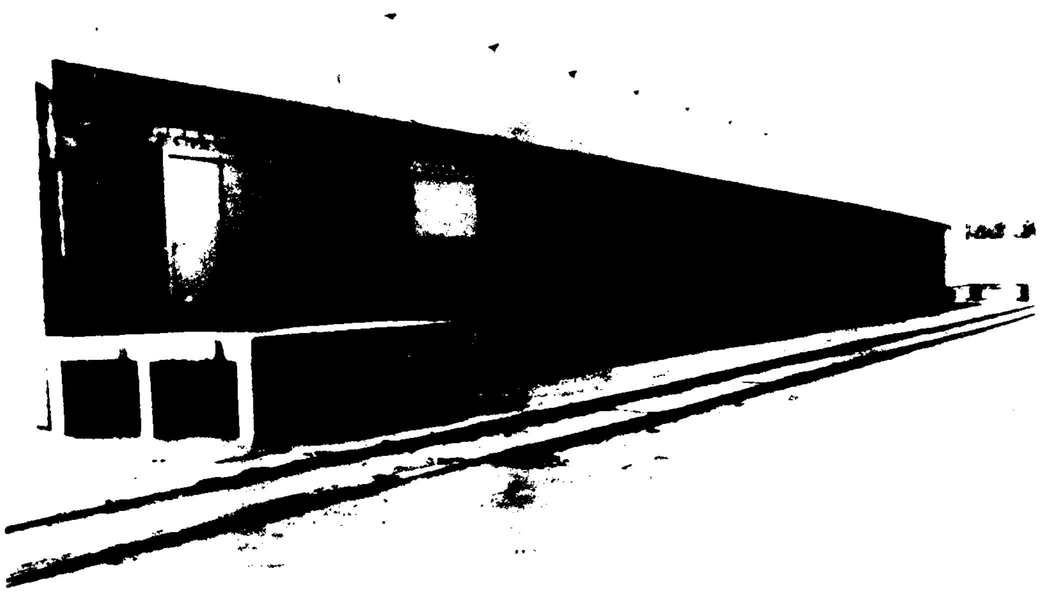


Figure 5. Track L1, side-loading ramp, one boxcar position, (extreme right). Side-loading dock (left).

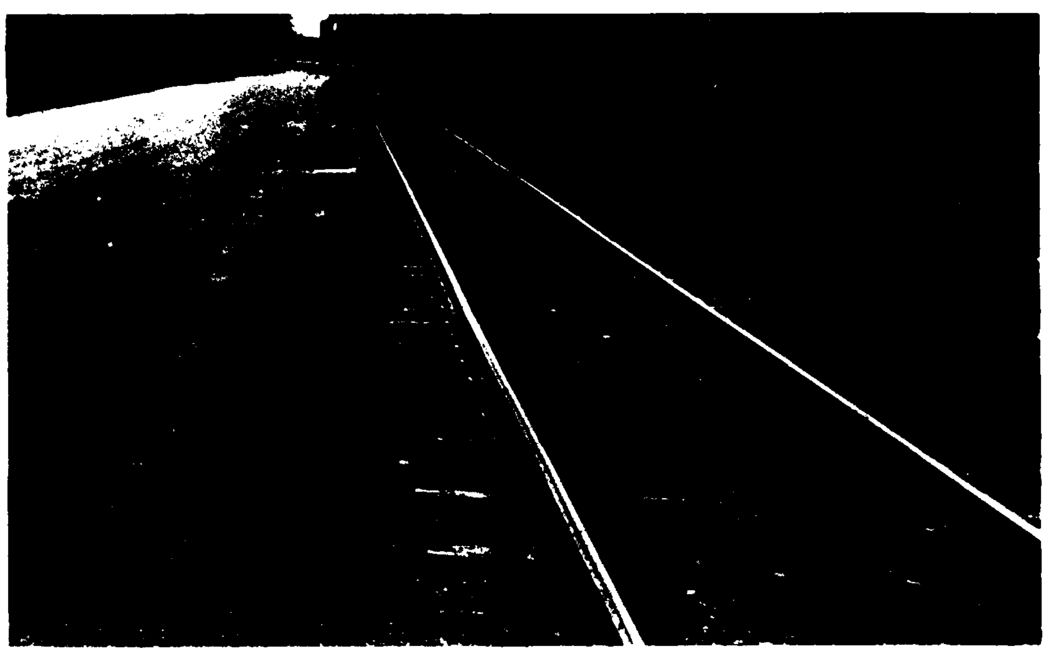


Figure 6. Track L3, southeasterly view.

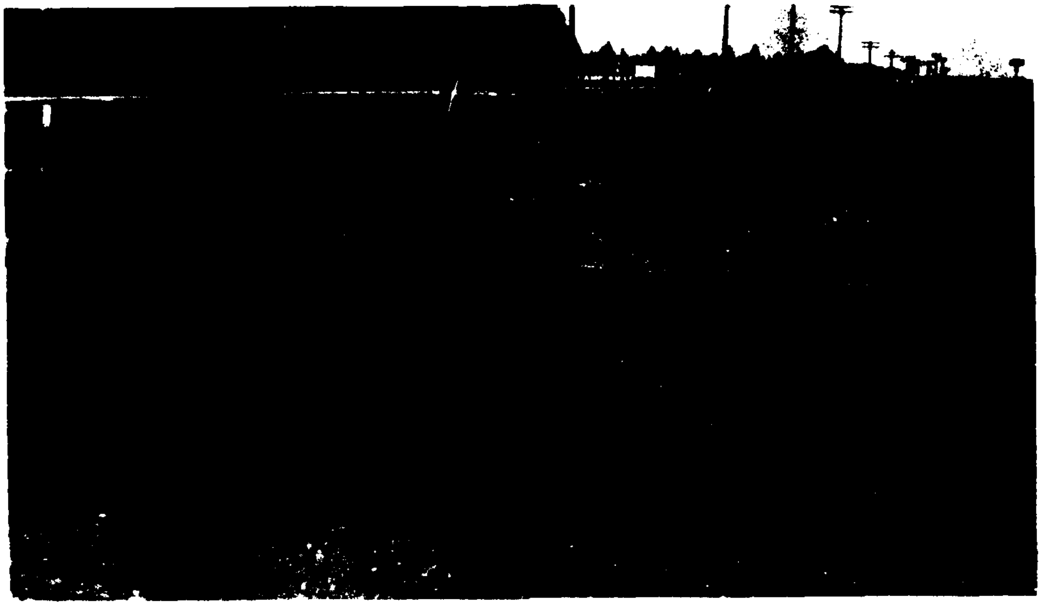


Figure 7. Track L5 (BNRR main line at Camp Ripley entrance), portable end ramp to be placed at upper right, north of south leg of wye.

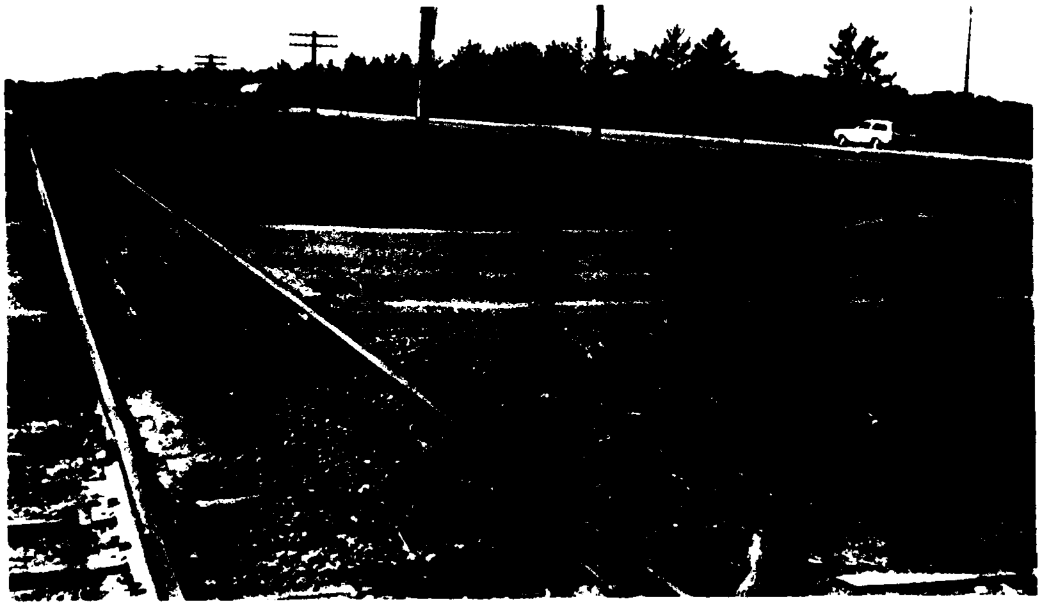


Figure 8. Track L5 (BNRR main line south of Camp Ripley entrance), southerly view.

Although most incoming supplies are delivered by truck, heavy equipment is delivered by rail. Currently, no rail outloading plans have been developed by Camp Ripley personnel.

D. RAIL SYSTEM ANALYSIS

1. Current Outloading Capability

An FRA inspector conducted a survey of all Camp Ripley trackage and found that the track meets FRA safety standards for Class 1. The trackage should be upgraded to Class 2 to support maximum outloading operations. The FRA inspector's report is contained in appendix D. Current rail outloading capability at Camp Ripley is limited by the physical capabilities of the rail system and by the shortage of small handtools, bridgeplates, and blocking and bracing materials. Utilizing present facilities, Camp Ripley's mobilization outloading capability is approximately 106 railcars per day. This outloading rate does not meet the requirement to outload the proposed mobilized division and its support units within a 10-day period. Use of end ramps, as identified in Plan 4, and use of the BNRR main line will increase the outloading capability to meet the mobilization outloading requirement.

Camp Ripley does not stock blocking and bracing material. These materials are ordered when the requirement arises. Also needed for a maximum efficient outloading operation are adequately trained blocking and bracing crews and completed outloading plans.

2. Rail Outloading Analysis

A complex system structure can be viewed as a series of interconnected subsystems. The limiting subsystem within the system establishes the maximum outloading capability. Therefore, in ascertaining the maximum rail outloading capability of Camp Ripley, the following subsystem separation was used:

a. Commercial Service Capabilities

Commercial service capabilities present no problem to Camp Ripley. The common carrier serving the post is the BNRR and its operations in the vicinity of Camp Ripley appear well organized. Also, since Little Falls, Minnesota,

has a classification yard about 9 miles from Camp Ripley, rail support for the outloading operation should not be a major problem.

b. Moving to and Loading on Railcars at a Particular Site

The movement of cargo to loading sites is relatively quick and efficient since most of the equipment is self-propelled, and access is along good, paved roads. Traffic patterns and traffic control would have to be set up, but such measures should be standard for full-scale outloading operations. Staging areas near the outloading sites are adequate, but queuing will block some streets. Recent field tests, during loading operations, revealed that vehicles move along the flatcars at an average speed of 1 mile per hour, with only one vehicle moving on a railcar at any one time. The longest string of empty flatcars used by the recommended outloading plan, assuming 57-foot car lengths (coupler-to-coupler), was 50 cars. Using that figure, the first vehicle would reach the end of the last car 32 minutes after driving up the ramp; then blocking and bracing could begin. Loading time is insignificant in comparison with blocking and bracing time (table 3).

Therefore, moving to and loading on the railcars is not the limiting subsystem. However, driving wheeled vehicles on flatcars "circus style" depends on the use of bridgeplates to span the gap between the cars.[3/] According to the plan employed in our analysis, bridgeplates are required for simultaneous loading at all sites where wheeled vehicles are to be loaded.

c. Blocking, Bracing, and Safety Inspections

Blocking, bracing, and safety inspection times are difficult to project. They depend on a number of variables such as:

(1) Crew size and experience.

(2) Extent of the safety inspection.

3/ Circus-style load--equipment is end loaded under its own power with little or no effort to fully utilize all floor space on the railcar; time is critical.

TABLE 3

TIMES REQUIRED TO PERFORM VARIOUS LOADING FUNCTIONS

	Action	Type Vehicle or Item Being Loaded	How Loaded	Time Required Min-Sec	Considerations
Bilevels	Vehicles Driving on Bilevel Railcars (89-ft long)	Jeep	Own power	1'-00" per Railcar Length	Average of 5 timings
	Vehicles Driving on Bilevel Railcars (89-ft long)	1-1/4-Ton Pickup	Own power	1'-03" per Railcar Length	Average of 6 timings
	Vehicles Driving on Bilevel Railcars (89-ft long)	Gama Goat	Own power	1'-32" per Railcar Length	Average of 8 timings
	Average Total Time to Load, Tiedown Vehicles on Bilevel Railcar, Complete	The three types above plus 3/4-ton trucks, mixed	Own power	34'-00" per Railcar	Average number of Bilevels loaded in string of cars - 15
TOFC's	Truck Tractor Backing Semitrailers on String of 89-ft TOFC Railcars	Semitrailers	Truck tractor	0'-42" per Railcar Length	Average number of TOFC cars in string --11, 2 trailers per car
	Average Total Time to Load and Secure Semi-trailer to Hitch on TOFC Railcar	Semitrailers	Truck tractor	10'-00" per Semi-trailer	Average number of TOFC cars in string --11, 2 trailers per car
Flats	2-1/2-Ton Trucks Circus Loading on 60-ft flats	2-1/2-Ton Trucks	Own power	30"-45" per Railcar Length	Average of several timings
	Total Time to Circus Load 11 60-ft Flats With 2-1/2-Ton Trucks, 2 per car (load only)	2-1/2-Ton Trucks	Own power	35'-00" per 11 60-ft Cars	
Forklift	Average Time for Rough Terrain Forklift Truck to Pick Standard-Size Containers (6-ft Wide, 8-ft Long, 5-ft High Approx) off Flatbed Truck, Transit 75 ft, and Load on Rail Flatcar.	Containers	Forklift	2'-12" per Container	Average of loading of 18 containers

(3) Documentation.

(4) Availability of blocking and bracing material and materials handling equipment (MHE).

During REFORGER 76, the establishment, as a reasonable goal for crews, of a 5-1/2- to 7-hour time limit for loading, blocking, and bracing at a loading site was based on experience and actual field tests of circus-style loadings. In addition, discussions with the blocking and bracing instructors at the US Army Transportation School, Fort Eustis, Virginia, indicated that, to avoid wasted man-hours, there should be no more than eight men per crew, regardless of experience.

At Camp Ripley, blocking and bracing materials and small handtools are in short supply. Procedures for obtaining these items, which are available locally, should be planned to assure that the division and its support equipment can be outloaded within the time specified by the contingency plan. Blocking and bracing crews should be trained on a periodic basis.

d. Interchange of Empty and Loaded Railcars

An efficient interchange of empty and loaded railcars requires careful planning and good coordination with the common carrier. Such an interchange can be established at Camp Ripley because the BNRR has good rail access and adequate trackage for storage of railcars.

The existence of the BNRR railyard in Little Falls makes it possible to accumulate the empty cars required for the operation. The various plans for spotting railcars depend on the type of operation. A place or location must be provided for railcars (1) in empty storage, (2) in loaded storage, and (3) at the loading sites. In general, three balanced or equally divided areas must exist somewhere in the vicinity. Empty railcars destined for Camp Ripley should be accumulated and classified in Little Falls prior to being moved to Camp Ripley. Thus, if the interchange of railcars follows some semblance of the organization presented in the simulation (app B), this subsystem will not limit the rail outloading capabilities of Camp Ripley.

e. Summary

Considering all the subsystems, the shortage of blocking and bracing materials, bridgeplates, and small handtools, along with the lack of trained blocking and bracing crews, emerge as the primary factors restraining any large rail outloading operation at Camp Ripley. Therefore, provision of these items is the major prerequisite for a successful operation. Another factor that affects station outloading at Camp Ripley is the destination of the unit material after it leaves the installation. Since Camp Ripley's coastal POE is more than 800 miles distant, all of the division equipment must go by rail.

This means that, for any major operation, a maximum effort with consequent high outloading rates will be required. Although Camp Ripley's rail system and the common carrier facilities serving it have the potential for supporting the deployment of the division and other support units in a timely manner, the actual capability at any one time will depend on the capability of the supporting subsystem.

3. Rail System Outloading Options

The various options for outloading plans are shown in table 4. Five plans for daylight-only loading were developed, using various combinations of recommended rail loading sites at both Camp Ripley and the BNRR main line near Camp Riley.

As soon as the loading, blocking and bracing, and inspection of the cars are completed, the outloading operations may begin. Through proper planning, 120-ton locomotives can pick up loaded cars from the loaded tracks and bring empties for the next cycle. The exact procedure for all switching operations, arrival of locomotives and empties, and departures is described in detail in the simulation for Plan 4 in appendix B. Four plans were developed to provide the approximate daily outloading rates of 50, 100, 150, and 200 railcars for all the equipment and one additional plan of 106 railcars for the nonroadable equipment only. All plans function similarly.

Plan 1 uses track L1, located on the south side of Rosenmeier Avenue, to produce an output of 49 railcars per day. Plan 2 adds track L2, which fully utilizes the entire loading area along Rosenmeier Avenue, for a total of 99 railcars per day.

TABLE 4

CAMP RIPLEY RAIL SYSTEM (AND BNRR NEAR CAMP RIPLEY) OUTLOADING OPTIONS

Track Section and Facilities	Railcar Capacity 57 ft Coupler to Coupler	Type of Ramp or Dock	Repair/Rebuild Items	Plan 1 49 RC	Plan 2 99 RC	Plan 3 156 RC	Plan 4[1/] 206 RC	Nonroadable Equipment 106 RC
L1	49	Concrete end ramp. 2 side-loading ramps (3 positions). 1 side-loading dock.		X	X	X	X	X
L2	50	None			X	X	X	X
L3	7	None				X	X	X
L4	50	None				X	X	
L5	50	None					X	
			Track repairs	2/	2/	2/	2/	
			Concrete end ramp		3/	3/	3/	3/
			Portable timber end ramp			4/	4/ X2	
Estimated Total Cost*					$10,000	$12,500	$15,000	$10,000

Legend

X - Track is used for that option.
RC - Railcars per 24-hour day.
* - All estimated costs are based on information from previous rail studies. Contingency, SIA, and design costs have not been considered in the total cost.

Notes

1/ Recommended plan.
2/ Maintenance costs required to upgrade track to Class 2 not included.
3/ Estimated cost to construct one concrete end-loading ramp - $10,000.
4/ Estimated cost to construct one timber end-loading ramp - $2,500.

Plan 3, which produces an outloading rate of 156 railcars per day, requires the addition of tracks L3 (a portion of the post access line) and L4 (a portion of the BNRR main line) near the Camp Ripley entrance.

Plan 4, the recommended plan, adds track L5 (a portion of the BNRR main line near Camp Ripley) and is shown in detail in appendix B. This plan achieves an outloading capability of 206 railcars per day, which fulfills the requirement to outload the division and the other mobilized units within approximately 10 days.

The nonroadable equipment plan uses tracks L1, L2, and L3 for the movement of all nonroadable equipment during the peak outloading.

4. Physical Improvements and Additions

Items listed below are all minimum requirements to provide the recommended outloading rate of 206 railcars per day (Plan 4) using existing trackage at Camp Ripley and portions of the BNRR main line track near Camp Ripley.

a. Repair track deficiencies indicated in the FRA track inspection report (app D).

b. Plan/program for:

(1) Construction of a concrete end-loading ramp at track L2.

(2) Construction of two portable timber end-loading ramps to be used at loading sites L4 and L5 on the BNRR near the entrance to Camp Ripley.

c. Establish the procedures for rapidly acquiring:

(1) A minimum stock of blocking and bracing material to supplement the post organic supply for handling all equipment when a rapid deployment of post units is required.

(2) Bridgeplates for volume outloading of wheeled vehicles.

(3) Sufficient small tools to permit operation of blocking and bracing crews at all outloading sites. This includes

powersaws, cable cutters, wrecking bars, cable-tensioning devices and hammers.

5. Analysis of Railcar Requirements

The expected rail outloading from Camp Ripley will be an infantry division and support-type units. At Camp Ripley's peak outloading period (outloading of the division and selected support units at the same time), these units will require 2,058 railcars, as indicated in table 5. The division and support units can be outloaded in 10 days using the Camp Ripley and the BNRR facilities. Other smaller units outloading prior to or after the peak outloading period impose no constraint on the system. The proposed rail outloading procedure (app B) can also be used for these units.

TABLE 5
ARMORED DIVISION AND SUPPORT UNITS RAILCAR REQUIREMENTS

Type of Equipment	Number of Railcars			
	57-Foot	80-Ton	Box	Total
Roadable	1,679	0	0	1,679
Nonroadable	308	3	0	311
Tracked	(203)	(3)	0	(206)
Other	(105)	0	0	(105)
Miscellaneous	0	0	68	68
Total	1,987	3	68	2,058

6. Discussion of Time and Costs

a. Physical Improvements

Track maintenance should be completed as soon as possible to preclude the possibility of locomotive or railcar derailment that could result in costly damage to equipment. The cost of this work will have to be determined from detailed estimates. Portable timber end-loading ramps will cost approximately $2,500 each, and concrete end ramps will cost approximately $10,000 each. These are essential for outloading heavy equipment and should be planned for. The portable ramps are usèful in training operations. Boxcar loading could present problems since the warehouses along Rosenmeier Avenue do not have side-loading docks (except one position), and seven boxcars must be outloaded per day

during the 10-day mobilization period. The best solution appears to be to load the boxcars at loading site L3, using portable timber platforms or possibly flatbed semitrailers parked parallel alongside the boxcars. Early action should be initiated to provide for the needed improvements.

b. Load Time Versus Equipment Type

(1) Mobilization Moves

Two basic types of outloading moves are mobilization and administrative. Since mobilization moves occur only during national energencies, urgency is paramount. The most rapid method of loading and securing mobile equipment on railcars is circus style. For example, if unit integrity is to be maintained, the 2-1/2-ton trucks that are to pull trailers drive onto the string of railcars, towing their trailers, and the equipment is secured in this configuration. This procedure is fast, but it wastes railcar space. During actual field tests on standard-type railcars, site times for the loading, securing, and inspection of 2-1/2-ton trucks (two per railcar), varied from 5 hours for flatcars with chain tiedowns to 6-1/2 hours for flatcars without chain tiedowns (fig 9 and table 6, items 4 and 5). This was a fast, efficient operation. Other similar operations that could occur for most Army units in a mobilization-type move, include using fork-lifts to load various sizes of containers onto standard-type flatcars. This operation, including loading, securing, and so forth, was accomplished in 5-1/2 hours (table 6, item 9).

All things considered, the circus-style loading operations indicate that, for mobilization moves, using standard-type flatcars, the loading, blocking and bracing, and inspections can be accomplished within from 5-1/2 to 7 hours for most equipment types (table 6, items 9 and 5). However, if a unit has a significant number of small items, such as "mules" (table 6, item 6), they are likely to require a 10-hour site time; this should be considered, rather than assuming that the work can be accomplished within 7 hours.

Figure 9. Circus-style loading of 2-1/2-ton trucks.

(2) Administrative Moves

For an administrative move, plenty of planning time exists; night operations are unnecessary except to finish work that is not completed during daylight hours and to switch railcars. This added flexibility helps to solve unforeseeable problems. The administrative move allows time for accumulating special-type railcars, such as bilevel autoracks and TOFC and COFC cars, which significantly reduce both labor and costs. For instance, small vehicles, jeeps, 3/4-ton trucks, 1-1/4-ton trucks, and gama goats can be loaded on bilevel cars (fig 10); semitrailers and vans can be loaded on TOFC cars; and MILVANs, for which there are no chassis, can be loaded on COFC cars. Mobile equipment, some 2-1/2-ton trucks, and all smaller vehicles can be loaded on bilevel railcars. These three specific types of railcars require no blocking and bracing except that integral to the car.

Loading and securing times for bilevels varied from an average of 7-1/2 hours for a string of cars that were fully equipped with chain tiedowns to 10-3/4 hours for those where cable tiedowns had to be fabricated to replace missing chain tiedowns. The average total time

TABLE 6

TYPICAL SITE LOADING AND BLOCKING AN

LEGEND

Type Railcar

B1 - Bilevel

TOFC - Trailer on flatcar

COFC - Container on Flatcar

DF - Flatcar/Integral Ch

F - Standard-Type Flatc

Item	Type Railcar	Average Number Loaded (Range)	Type Load	How Loaded	Total Site Time Required (hrs) and Other Considerations	Details on
1	B1 89 ft	16 15-17	C	End, own power	7.5 All cars had chain tiedowns. Cars did not have bridge PL's, wooden PL's used	Typical Load: 50 jeeps, 6-1¼ ton, 14 Gama Goats, number vehicles - 170
2	B1 89 ft	14½ 11-18	C	End, own power	10.7 All cars did not have chain tiedowns, used wooden bridge PL's.	Typical Load: 50 jeeps, 6-1¼ ton, 14 Gama Goats, number vehicles - 170
3	TOFC 89 ft	12 10-12	C	End, backed on by tractor	4.0	Semitrailers - mostly MI to form 40-ft semis. So military vans on semis.
4	DF 60 ft	11 9-14	C	End, own power	5.1 Chain tiedowns on all cars, wood wheel chocks, lateral wood blocking at wheels	All 2-1/2-ton trucks, va per railcar.
5	F 54 ft	10	C	End, own power	6.5 Cable tiedowns made at site. Wheel chocks, lateral wheel blocking	All 2-1/2-ton trucks, va per railcar.
6	F 54 ft	10 9-10	A	End, own power. Some forklift	10.0 Cable tiedowns made at site. Wood blocking as required.	1/4-ton trailers Wreckers Forklifts Mules, jeeps, CONEX conta
7	F 54 ft	9	A	Forklift, manpower	10.8 Cable tiedowns made at site. Wood blocking as required.	All 1/4-ton trailers or of similar small items.
8	DF 60 ft	10 8-13	A	Rough terrain forklifts	8.3 Chain tiedowns on all cars. Wheel blocking used also	All two-wheeled trailers pulled by 2-1/2-ton truc 5 trailers/railcar
9	F 54 ft	9	A	Rough terrain forklifts	5.5 Cable tiedowns made at site. Blocking as required.	All containers - 5 cars with 8 containers 3 cars with 4 containers 1 car with 10 containers

6

G AND BRACING TIMES (TOTAL)

al Chain Tiedowns
Flatcar

Type Load
A - Administrative
C - Circus

ls on Type Load	Manpower	Typical Problems
Jeeps, 15-3/4-ton trucks, oats, each level, total 170	1½-2 men per vehicle	No bridge PL's on cars had to use wooden PL's. Man has to walk to front of vehicle as guide and to straighten bridge PL's. Delays if all vehicles not at site at loading time.
Jeeps, 15-3/4-ton trucks, oats, each level, total 170	1½-2 men per vehicle	Same as above; and, missing tiedowns; cable tiedowns had to be fabricated and used. (Storm, rain not included in total time)
tly MILVAN married together . Some 20-ft semis and mis. Two per TOFC car.	6-8 man crew	Some older cars have trailer hitches which have to be "pulled-up" into position by a cable attached to the tractor.
ks, various kinds, two	10 men per railcar	None
ks, various kinds, two	10 men per railcar	None
containers	10 men per railcar	Improper installation of tiedowns and blocking. Large number of small items, 1/4-ton trailer slow the installation of blocking since work has to proceed from one end of railcar to the other.
s or high percentage tems.	10 men per railcar	Improper installation of tiedowns and blocking. Large number of small items, 1/4-ton trailer slow the installation of blocking since work has to proceed from one end of railcar to the other.
ailers (various types trucks)	10 men per railcar	None noted
iners each. iners each. iners each.	10 men per railcar	None noted

for TOFC cars was 4 hours. Administrative loads, which require relatively longer times and more effort, are illustrated in figures 11 and 12[4/]. This type of load required a total site time of 10 to 11 hours. In general, administrative moves should be planned for daylight hours, leaving night hours available for finishing up sites that started late or were slowed by problems and railcar switching. This type of planning allows enough flexibility to resolve problems and complete the operation on schedule. For mobilization moves, site time to load and secure equipment on a string of railcars should be accomplished in 5-1/2 to 7 hours, and for administrative moves, in 4 to 11 hours (table 6, items 3 and 7).

The time/motion studies conducted during the REFORGER 76 exercise (an administrative move) resulted in the accumulation of valuable information for planning future station outloading operations and is included in tables 3 and 6. It should be noted that times required to load are relatively minor as compared with times required to secure the equipment. As an example, a jeep can drive across an 89-foot-long bilevel car in 1 minute, and a forklift truck can load a container in 2 minutes 12 seconds. So, loading times are not the problem. Also, as soon as the first vehicle is in position, several simultaneous operations are in effect--loading, blocking, and tieing down.

Thus, for future planning, site times should be used as a general rule: 5-1/2 to 7 hours for a mobilization move, and 4 to 11 hours for an administrative move. The 5-1/2-hour minimum for a mobilization move is based on the assumption that only standard-type railcars are available. The 4-hour minimum for an administrative move carries the assumption that there is time to

[4/] Administrative load--equipment to be loaded (wheeled or otherwise) is placed on the car so as to achieve maximum utilization of floor space; it may be stacked; cost is important. Both types of loads, circus and administrative, may be used in either a mobilization or an administrative move depending upon the type of equipment to be moved. An example is item 9 in a mobilization move, item 5 in an administrative move.

Figure 10. Lower level of bilevel cars loaded with jeeps, gama goats, 3/4-ton trucks, and 1-1/4-ton trucks.

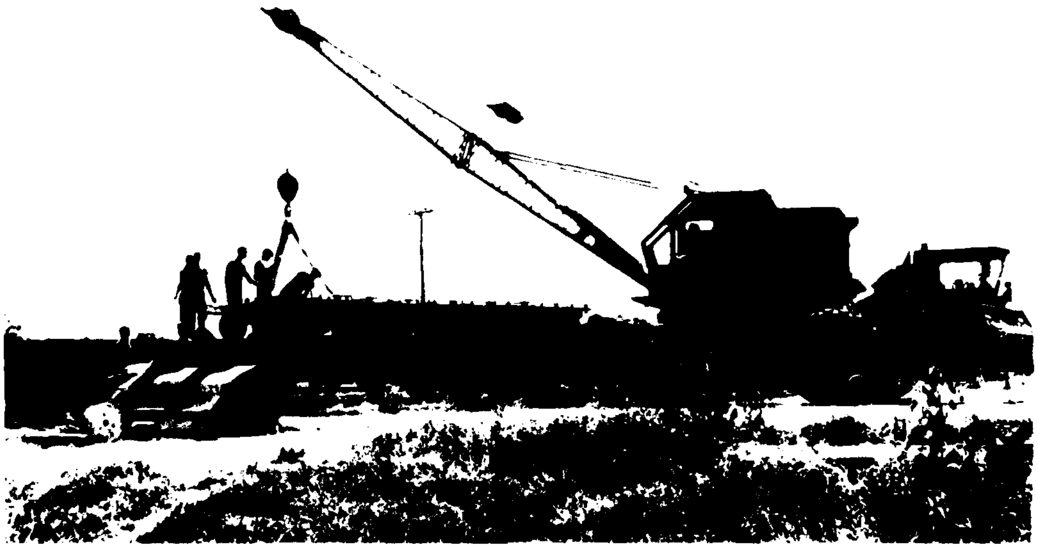


Figure 11. Administrative loading, mules.

plan and assemble the most appropriate type of railcars for the equipment to be moved. The 4 hours, in this instance, was the average time required to load and secure semitrailers and vans on a string of twelve 89-foot-long TOFC cars.

Figure 12. Administrative loading, 1/4-ton trailers.

To minimize the number of faulty or unacceptable loads that have to be done over, inspection of the loaded cars by the railroad inspector should proceed simultaneously with the work.

c. Transportation Equipment Costs--Bilevel Railcars Versus 54-Foot Standard Flatcars

A cost comparison, using nine different types of equipment scheduled for outloading in the REFORGER 77 exercise, revealed that $129,431 in transportation and materials (timber, cable, and so forth) could be saved by shipping the equipment on bilevel railcars rather than on standard-type 54-foot flatcars. The equipment items vary from 1/4-ton trailers to 2-1/2-ton trucks. A total of 623 vehicles could be transported on 55 bilevel railcars; see table 7 for details and appendix C for more information on special-purpose railcars.

TABLE 7

COST COMPARISON, BILEVELS VERS

Column Number	1	2	3	4	5	6	7
Item No.	Vehicle Type	Model Number	Weight (lbs)	Height (in.)	Length (in.)	Quantity to be Shipped	Quant on 54 Rail
1	2-1/2-Ton Truck	M35A2	13,360	80.8	264.8	110	2
2	Gama Goat, 1-1/4-Ton	M561	7,480	71.9	231.1	27 1/	2
3	M105A2 1-1/2-Ton Trailer	M105A2	2,670	82.0	166.0	113	3
4	1/4-Ton Trailer	M416	580	44.0	108.5	136	10
5	400-Gal Water Trailer	M149A1	2,530	80.6	161.4	20	4
6	1-1/4-Ton Truck	M880	4,695	73.5	218.5	11	2
7	3/4-Ton Trailer	M101	1,350	50.0	147.0	8	4
8	1/4-Ton Truck	M151	2,350	52.5	131.5	180	7
9	1-1/4-Ton Como Truck	M884	4,648	67.5	218.5	18	2
	Total					623	

SUMMARY

Total cost to ship the 9 different items (623 vehicles) by 54-foot-long standard flatcars, Colu

Total cost to ship the 9 different items (623 vehicles) by 89-foot-long bilevel flatcars, Colum

Savings in transportation costs if shipped by bilevel flats (Column 10-- Column 14)

Additional costs of blocking and bracing materials if shipped by 54-foot standard flatcars

Total savings if these nine items shipped by bilevel versus 54-foot flatcar

1/ Excess vehicles shipped on other railcars that are not completely utilized.

2/ Estimated average additional costs of blocking and bracing materials per vehicle.

TABLE 7

ILEVELS VERSUS 54-FOOT FLATCARS

	7	8	9	10 (8 x 9)	11	12	13	14 (12 x 13)
tity be pped	Quantity on 54-ft Railcar	Dollars	No. of 54-ft Cars Required	Trans Cost for Item	Quantity on 89-ft Bilevel	Dollars	No. of Bilevels Required	Trans Cost for Item
0	2	2,413	55	132,715	6	7,238	18	130,284
27[1/]	2	2,167	13	28,171	8	5,402	4	21,608
3	3	2,167	37	80,179	12	3,612	9	32,508
6	10	2,167	14	30,338	36	3,612	4	25,284
0	4	2,167	5	10,835	12	3,612	2	7,224
1	2	2,167	5	10,835	8	3,612	2	7,224
8	4	2,167	2	4,334	12	3,612	1	3,612
0	7	2,167	25	54,175	14	3,612	13	46,956
8	2	2,167	9	19,503	8	3,612	2	4,334
3				371,085			55	279,034

tcars, Column 10	$371,085	
tcars, Column 14	279,034	
)	$ 92,051	
latcars	37,380	($60[2/] x 623)
	$129,431	

III. ANALYSIS OF COMMERCIAL RAIL FACILITIES WITHIN THE CAMP RIPLEY AREA

The present facilities at Camp Ripley are not adequate to handle the peak mobilization requirement for the installation. All commercial rail facilities within 25 miles of Camp Ripley were surveyed to determine the feasibility of their use during full-scale rail outloading operations. Many factors were considered in making the determination, including:

a. Road access to the facility.

b. Type of facility available--ramps, lighting.

c. Equipment staging and queuing areas.

d. Railcar storage and loading capacities.

e. Track and facility maintenance conditions.

f. Main line activity levels.

g. Added expense of using commercial facilities.

h. Security problems.

The best sites to handle the shortfall are along the BNRR main line track at the entrance to Camp Ripley. These are better than the other facilities because: they are close, security will be less of a problem, the main line track north of Camp Ripley is under study by the BNRR for abandonment, and most of the other sites will be needed for railcar storage. Since these sites are adjacent to Camp Ripley, and are included in the recommended plan, they are described in table 2. Other alternate sites are described in table 8 and figures 13 through 20.

Little Falls Classification Yard

This yard (figs 13 and 14) could be used as an alternate loading site. There are three good end-loading sites, one with a substantial timber end ramp and a side-loading dock suitable for four boxcars. Access is good from the south (Broadway) and west side at the TOFC ramp. The capacity of this yard makes it suitable for accumulating and staging empty railcars to support rail operations at Camp Ripley; this should be its function in an outloading operation.

TABLE 8
RAIL FACILITIES WITHIN 25 MILES OF CAMP RIPLEY

Priority Site Distance in Miles Figure Number	Ramp/Dock	Lighting	Surface Conditions	Staging Area	Railcar Capacity	Access Availability	Present Condition of Track*	Note
1 9 miles Little Falls classification yard (figs 13 and 14)	TOFC ramp side loading dock	At side dock only	Good	Small would block streets	Large yard 300+	Good, but on city streets	Class 1 up to 3	Three good end-loading sites without using classification tracks. Side loading dock for 4 boxcars
2 Little Falls east side of river, 8 miles (figs 15 and 16)	None	No	Natural ground	Large along tracks	Industrial sidings 60+	Good, but by city streets	Class 1 not used much	Could be used for loading sites but in industrial/residential areas
3 Randall, 8 miles (fig 17)	No	No	Natural ground	Large, but would block streets	38	Good on town streets	Class 1 to 2	Two short sidings could be used but one is adjacent to main track. Long siding, poor access and not included in capacity
4 Royalton. 17 miles (figs 18 and 19)	None	No	Natural ground	Small along tracks	55	Good	Class 1	One end-loading site and one siding could be used for loading.
5 Belle Prairie, 4 miles (fig 20)	Dirt	No	Natural ground	No	5	Poor, on opposite side of main track from highway	Class 1 not used	Short spur, poor site

*Indicates track condition based on a general inspection, not a detailed inspection of all track components, which might result in a lower classification of the track.

Figure 13. Little Falls, classification yard, northerly view from Broadway. Two of three possible end-loading sites in foreground.

Figure 14. Little Falls, west side of classification yard. TOFC ramp (foreground) and side-loading dock for four boxcars (center).

Figure 15. Little Falls, east side of river, northerly view from Broadway.

Figure 16. Little Falls, east side of river, southerly view from Broadway.

Figure 17. Randall, northerly view. Main line track (right), long siding (center), one of short sidings (left), with loading site.

Figure 18. Royalton, southerly view. Two main line tracks (center), siding (right), and spur (left).

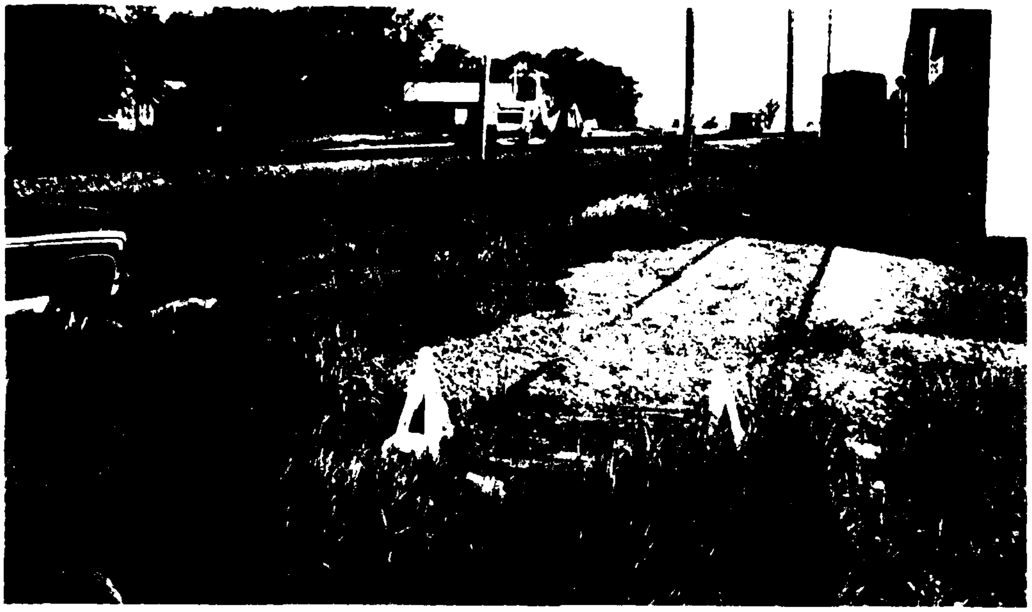


Figure 19. Royalton, northerly view from south end of spur.

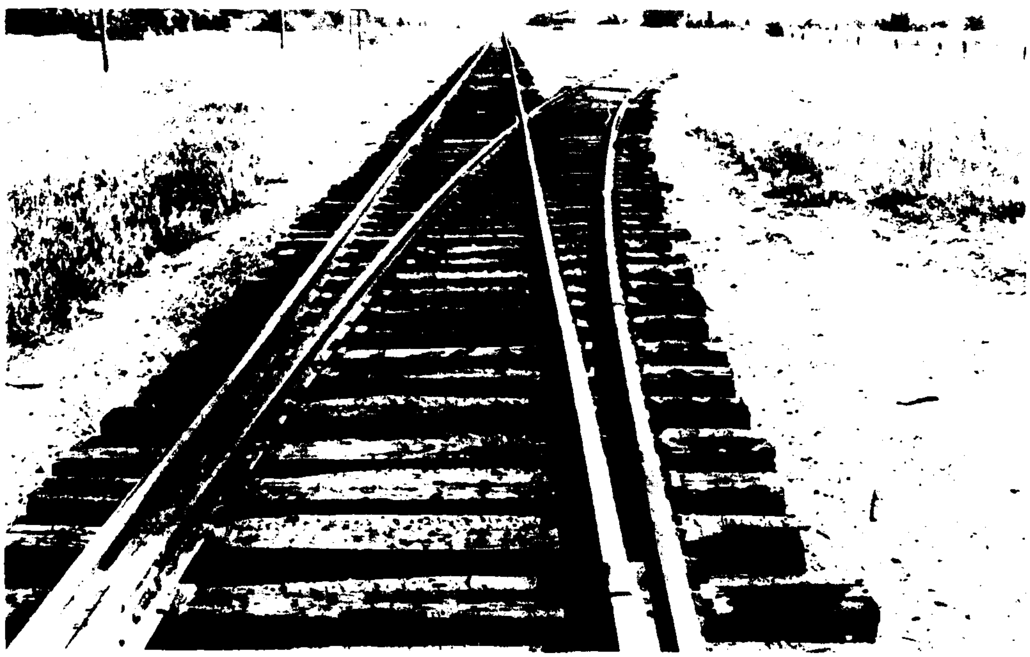


Figure 20. Belle Prairie, northerly view. Main line track (center), spur (right), highway US 371 (left).

Little Falls, East Side of River

This site is in a light industrial/residential area and could be used as an outloading site since access is good and there are large open areas along the tracks (figs 15 and 16). The capacity of the trackage makes it suitable for railcar storage in support of Camp Ripley.

Randall

This site has one long siding/passing track and two short sidings. Access is good, and there is a possible loading site along one siding (fig 17).

Royalton

There are two possible loading sites, a spur and a siding; access to both is good (figs 18 and 19).

Belle Pairie

This is a very poor loading site due to its small capacity and to its location (fig 20).

IV. SPECIAL EQUIPMENT FOR EXPEDITING THE OUTLOADING OF MILVANS

A large supply of trailer-on-flatcar railcars is usually in the system, and container-on-flatcar railcars may be available. These cars should be used to transport semitrailers and MILVANs. If COFC or TOFC flatcars are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars for transporting MILVANs. See appendix C for additional information.

V. ANALYSIS OF MOTOR SYSTEM OUTLOADING CAPABILITY

A. GENERAL

Major highway access to Camp Ripley is provided by US Route 371, which parallels the east boundary of the installation. The internal road network within Camp Ripley is capable of handling all types of highway vehicles along its major arteries. Neither access to the highway system nor the system itself restrains motor outloading capability or movement of roadable military vehicles.

B. MOTOR LOADING FACILITIES

Basically two types of motor vehicle, that is, flatbed and van semitrailer, would be required to meet the motor outloading needs of Camp Ripley. A description of the loading facilities associated with each vehicle type follows:

1. Loading Ramps

A survey of facilities that might have end-loading ramps to load vehicles onto commercial flatbed semitrailers revealed that there are two such ramps with five outloading positions that could be used concurrently with a rail outloading operation (table 9 and figs 21 and 22). As a separate operation, without rail outloading, there are 6 ramps with 11 outloading positions, including the existing rail ramp.

2. Loading Platforms/Docks

The other type of motor outloading facility is the loading platform from which van semitrailers are loaded. It is the medium, along with the forklift, that is used to transfer cargo from truck to truck, truck to warehouse, and vice versa. The only warehouse equipped with a side-loading dock is illustrated in figure 5.

C. FLATBED SEMITRAILER OUTLOADING

The loading procedure could be as follows: A vehicle is driven up the ramp and onto the waiting semitrailer, temporary chocks are placed, and the loaded truck is driven slowly away from the ramp to a designated location where it is secured with tiedown chains. The next

TABLE 9
VEHICLE END-LOADING RAMPS AND DOCKS

Ramp and Figure	Location	Type of Ramp	Surface Condition	Staging	Access	Remarks
Concurrent With Rail Operations						
1 Ramp, 3 Positions (fig 21)	Libby Ave near Bldg U-61	Concrete	Sandy soil	Large	Good	New concrete, three different levels for height of truck
1 Ramp, 2 Positions (fig 22)	Near sanitary fill	Earth timber	Natural soil	Large	Good	
Without Rail Operations						
5 above	See above					
1 Ramp 1 Position (fig 3)	End of south spur track	Concrete	Good, paved	Large	Good	Rail end-loading ramp
1 Ramp 4 Positions (fig 4)	U-14 on south spur track	Concrete and earth	Good	Large	Good	Rail side-loading ramp for south spur, could be used for end-loading trucks
1 Ramp 1 Position (fig 5)	South end of Bldg U-11	Timber side ramp for rail	Good	Large	Good	Rail side-loading ramp, could be used for end-loading trucks
Van loading - only one warehouse has a loading dock and it is for one position only, adjacent to the south spur at Bldg U-11.						

Figure 21. Concrete end-loading ramp, three positions, left side of figure.

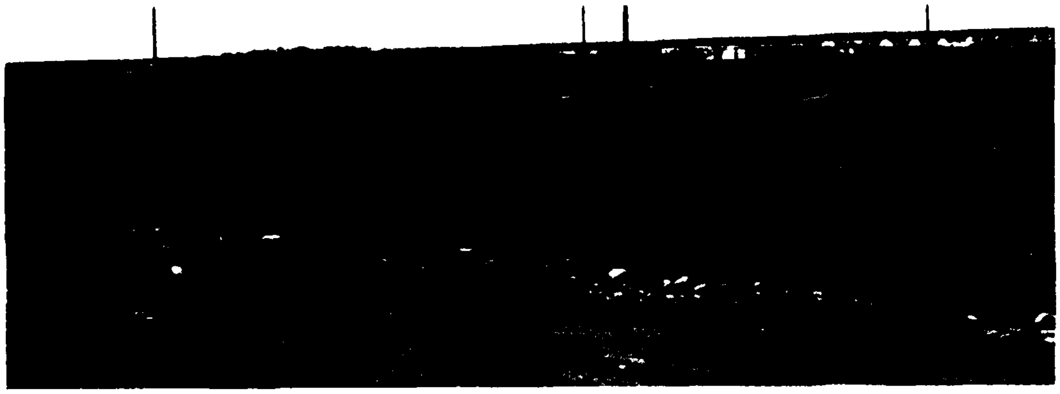


Figure 22. Earth/timber ramps, two positions.

semitrailer is backed up to the ramp, and the procedure is repeated. Under this procedure, the ramp is not occupied while loaded vehicles are being secured. Using a conservative 60 minutes for each cycle, 1 semitrailer could be loaded per hour per ramp, or 10 vehicles per ramp per 10-hour shift. In most cases, 60 minutes would not be required.

1. Concurrent With Rail Operations

There are two ramps with five outloading positions that could be used while rail operations are in progress. Using a 60-minute cycle, per ramp, a 10-hour workday could produce 50 semitrailer loads, for daylight operation only. This does not include expedient means, such as excavating sloping ditches into which semitrailers could be backed for loading; nor use of 6,000-pound commercial forklift trucks, if they are not assigned to railcar loading; nor the use of mobile cranes. Numerous possibilities exist for increasing motor outloading facilities.

2. Without Rail Operations

If rail operations are not in progress, there are 6 loading ramps with 11 outloading positions to load commercial semitrailers. At 60 minutes per cycle per ramp, 110 semitrailers could be outloaded in a 10-hour workday. However, the possibility of obtaining 110 commercial semitrailers locally on any day seems highly unlikely. Therefore any constraint on Camp Ripley's semitrailer outloading capability is not the lack of facilities, but the lack of semitrailers.

D. VAN SEMITRAILER OUTLOADING

Since Camp Ripley has only one side-loading dock position, vans will have to be loaded by expedient means; that is, the forklifts place the cargo at the rear of the truck cargo bed and the cargo is moved into final position by hand labor. Using this procedure and the eight 2,000- to 6,000-pound-capacity forklifts, 32 vans could be loaded in a 10-hour period.

VI. CONCLUSIONS

1. The BNRR currently plans to abandon their main line track north of Camp Ripley Junction; 6,400 feet of this main line track, north of the north switch of the Camp Ripley wye, is needed for mobilization requirements. (Arrangements have been completed by MTMC and BNRR to retain the needed trackage.)

2. Most of Camp Ripley's railroad trackage is classified as Class 1, according to federal track safety standards. Minor maintenance on deficient sections would upgrade all trackage to a Class 2 condition.

3. Other constraints limiting Camp Ripley's rail outloading capability are a shortage of blocking and bracing materials, small handtools, and bridgeplates; insufficient trained blocking and bracing crews; and a lack of outloading plans.

4. End-loading ramps are needed for the three additional identified loading sites, and side-loading docks will be needed for seven boxcars per day.

5. After the deficiencies noted above are corrected and upon receipt of sufficient railcars to permit full-scale outloading, Camp Ripley could outload 106 railcars per 24-hour period. However, to meet the total requirement, 100 railcars will need to be outloaded per 24-hour period on the BNRR main line at Camp Ripley.

6. Empty railcars (dedicated train lengths) destined for Camp Ripley should be positioned in train-loading sequence in Little Falls.

7. Camp Ripley's transportation personnel should coordinate planning of impending outloading operations with the BNRR representatives at the earliest possible date.

8. For administrative-type moves, when leadtime is plentiful and costs must be considered, special-purpose railcars (such as bilevel autoracks, trailer-on-flatcar (TOFC), and container-on-flatcar (COFC)) are more cost-effective than the standard types and should be used to the extent they are available.

9. For mobilization moves, when time is more critical than cost, the use of special-purpose railcars may not be possible because of the short leadtime and relatively short supply of these high-demand cars.

10. Motor outloading is not a good alternative to rail because Camp Ripley is more than 800 miles from any POE.

11. For concurrent rail and motor operations, 50 flatbed and 32 van semitrailers could be loaded per 10-hour day (for daylight operations only), and for separate operations, 110 flatbed and 32 van semitrailers could be loaded during the same period. This capability exceeds the probable available supply of semitrailers.

12. The maximum curvature of the railroad tracks is less than 12 degrees. Consequently, any known length of railcar car be used on the installation.

VII. RECOMMENDATIONS

1. Use the BNRR main line track near the entrance to Camp Ripley to outload the mobilization shortfall.

2. Undertake those items listed in section II, paragraph D4, "Physical Improvements and Additions." These improvements will provide a rail system capability of 206 railcars per 24-hour day as well as an effective rail system.

3. Prepare a detailed unit outloading plan, using the simulation in appendix B as an example, specifying unit assignments at loadout sites and movement functions.

4. Coordinate rail outloading plans with BNRR representatives at the earliest possible date.

5. Initiate a rail facility maintenance program to insure an effective rail system.

6. Provide advance training for blocking and bracing crews.

7. Station road guards at all railroad crossings during outloading operations, and provide all train crewmen with walkie-talkies to insure a safer and more efficient operation.

8. Keep abreast of BNRR railroad maintenance plans on the main line trackage to Little Falls.

9. Use special-purpose railcars (such as bilevel autoracks for small vehicles, TOFC cars for semitrailers and vans, and COFC cars for MILVANs) for administrative-type moves, and, as available, for mobilization moves.

10. Provide warehousing for blocking and bracing materials and small-tool supplies.

11. Coordinate with MTMC any removal of railroad track that is included in the mobilization outloading plan.

12. Construct any new track with a maximum curvature of 12 degrees.

APPENDIX A

TRACK SAFETY STANDARDS [5/]

PART 213—TRACK SAFETY STANDARDS

AUTHORITY: The provisions of this Part 213 issued under sections 202 and 209. 84 Stat. 971, 975; 45 U.S.C. 431 and 438 and 1.49(n) of the Regulations of the Office of the Secretary of Transportation; 49 CFR 1.49(n).

SOURCE: The provisions of this Part 213 appear at 36 F.R. 20336, Oct. 20, 1971, unless otherwise noted.

Subpart A—General

213.1 Scope of part.

This part prescribes initial minimum safety requirements for railroad track

[5/] Extracted from Title 49, Transportation, Parts 200 to 999, pp 8-19, Code of Federal Regulations, 1973.

that is part of the general railroad system of transportation. The requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track.

§ 213.3 Application.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage track in the general railroad system of transportation.

(b) This part does not apply to track—

(1) Located inside an installation which is not part of the general railroad system of transportation; or

(2) Used exclusively for rapid transit, commuter, or other short-haul passenger service in a metropolitan or suburban area.

(c) Until October 16, 1972, Subparts A, B, D (except § 213.109), E, and F of this part do not apply to track constructed or under construction before October 15, 1971. Until October 16, 1973, Subpart C and § 213.109 of Subpart D do not apply to track constructed or under construction before October 15, 1971.

§ 213.5 Responsibility of track owners.

(a) Any owner of track to which this part applies who knows or has notice that the track does not comply with the requirements of this part, shall—

(1) Bring the track into compliance; or

(2) Halt operations over that track.

(b) If an owner of track to which this part applies assigns responsibility for the track to another person (by lease or otherwise), any party to that assignment may petition the Federal Railroad Administrator to recognize the person to whom that responsibility is assigned for purposes of compliance with this part. Each petition must be in writing and include the following—

(1) The name and address of the track owner;

(2) The name and address of the person to whom responsibility is assigned (assignee);

(3) A statement of the exact relationship between the track owner and the assignee;

(4) A precise identification of the track;

(5) A statement as to the competence and ability of the assignee to carry out the duties of the track owner under this part; and

(6) A statement signed by the assignee acknowledging the assignment to him of responsibility for purposes of compliance with this part.

(c) If the Administrator is satisfied that the assignee is competent and able to carry out the duties and responsibilities of the track owner under this part, he may grant the petition subject to any conditions he deems necessary. If the Administrator grants a petition under this section, he shall so notify the owner and the assignee. After the Administrator grants a petition, he may hold the track owner or the assignee or both responsible for compliance with this part and subject to penalties under § 213.15.

§ 213.7 Designation of qualified persons to supervise certain renewals and inspect track.

(a) Each track owner to which this part applies shall designate qualified persons to supervise restorations and renewals of track under traffic conditions. Each person designated must have—

(1) At least—

(i) One year of supervisory experience in railroad track maintenance; or

(ii) A combination of supervisory experience in track maintenance and training from a course in track maintenance or from a college level educational program related to track maintenance;

(2) Demonstrated to the owner that he—

(i) Knows and understands the requirements of this part;

(ii) Can detect deviations from those requirements; and

(iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements in this part.

(b) Each track owner to which this part applies shall designate qualified persons to inspect track for defects. Each person designated must have—

(1) At least—

(i) One year of experience in railroad track inspection; or

(ii) A combination of experience in track inspection and training from a course in track inspection or from a college level educational program related to track inspection;

(2) Demonstrated to the owner that he—

(i) Knows and understands the requirements of this part;

(ii) Can detect deviations from those requirements; and

(iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements of this part, pending review by a qualified person designated under paragraph (a) of this section.

(c) With respect to designations under paragraphs (a) and (b) of this section, each track owner must maintain written records of—

(1) Each designation in effect;

(2) The basis for each designation, and

(3) Track inspections made by each designated qualified person as required by § 213.241.

These records must be kept available for inspection or copying by the Federal Railroad Administrator during regular business hours.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973]

§ 213.9 Classes of track: operating speed limits.

(a) Except as provided in paragraphs (b) and (c) of this section and §§ 213.57 (b), 213.59(a), 213.105, 213.113 (a) and (b), and 213.137 (b) and (c), the following maximum allowable operating speeds apply:

[In miles per hour]

Over track that meets all of the requirements prescribed in this part for—	The maximum allowable operating speed for freight trains is—	The maximum allowable operating speed for passenger trains is—
Class 1 track	10	15
Class 2 track	25	30
Class 3 track	40	60
Class 4 track	60	80
Class 5 track	80	90
Class 6 track	110	110

(b) If a segment of track does not meet all of the requirements for its intended class, it is reclassified to the next lowest class of track for which it does meet all of the requirements of this part. However, if it does not at least meet the requirements for class 1 track, no operations may be conducted over that segment except as provided in § 213.11.

(c) Maximum operating speed may not exceed 110 m.p.h. without prior approval of the Federal Railroad Administrator. Petitions for approval must be filed in the manner and contain the information required by § 211.11 of this chapter. Each petition must provide sufficient information concerning the performance characteristics of the track, signaling, grade crossing protection, trespasser control where appropriate, and equipment involved and also concerning maintenance and inspection practices and procedures to be followed, to establish that the proposed speed can be sustained in safety.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973; 38 FR 23405, Aug. 30, 1973]

§ 213.11 Restoration or renewal of track under traffic conditions.

If, during a period of restoration or renewal, track is under traffic conditions and does not meet all of the requirements prescribed in this part, the work and operations on the track must be under the continuous supervision of a person designated under § 213.7(a).

§ 213.13 Measuring track not under load.

When unloaded track is measured to determine compliance with requirements of this part, the amount of rail movement, if any, that occurs while the track is loaded must be added to the measurement of the unloaded track.

[38 FR 875, Jan. 5, 1973]

§ 213.15 Civil penalty.

(a) Any owner of track to which this part applies, or any person held by the Federal Railroad Administrator to be responsible under § 213.5(c), who violates any requirement prescribed in this part is subject to a civil penalty of at least $250 but not more than $2,500.

(b) For the purpose of this section, each day a violation persists shall be treated as a separate offense.

Exemptions.

(a) Any owner of track to which this part applies may petition the Federal Railroad Administrator for exemption from any or all requirements prescribed in this part.

(b) Each petition for exemption under this section must be filed in the manner and contain the information required by § 211.11 of this chapter.

(c) If the Administrator finds that an exemption is in the public interest and is consistent with railroad safety, he may grant the exemption subject to any conditions he deems necessary. Notice of each exemption granted is published in the FEDERAL REGISTER together with a statement of the reasons therefor.

Subpart B—Roadbed

§ 213.31 Scope.

This subpart prescribes minimum requirements for roadbed and areas immediately adjacent to roadbed.

§ 213.33 Drainage.

Each drainage or other water carrying facility under or immediately adjacent to the roadbed must be maintained and kept free of obstruction, to accommodate expected water flow for the area concerned.

§ 213.37 Vegetation.

Vegetation on railroad property which is on or immediately adjacent to roadbed must be controlled so that it does not—

(a) Become a fire hazard to track-carrying structures;

(b) Obstruct visibility of railroad signs and signals;

(c) Interfere with railroad employees performing normal trackside duties;

(d) Prevent proper functioning of signal and communication lines; or

(e) Prevent railroad employees from visually inspecting moving equipment from their normal duty stations.

Subpart C—Track Geometry

§ 213.51 Scope.

This subpart prescribes requirements for the gage, alinement, and surface of track, and the elevation of outer rails and speed limitations for curved track.

§ 213.53 Gage.

(a) Gage is measured between the heads of the rails at right angles to the rails in a plane five-eighths of an inch below the top of the rail head.

(b) Gage must be within the limits prescribed in the following table:

Class of track	The gage of tangent track must be—		The gage of curved track must be—	
	At least—	But not more than—	At least—	But not more than—
1	4′ 8″	4′ 9¾″	4′ 8″	4′ 9¾″
2 and 3	4′ 8″	4′ 9½″	4′ 8″	4′ 9¾″
4	4′ 8″	4′ 9¼″	4′ 8″	4′ 9½″
5	4′ 8″	4′ 9″	4′ 8″	4′ 9½″
6	4′ 8″	4′ 8¾″	4′ 8″	4′ 9″

§ 213.55 Alinement.

Alinement may not deviate from uniformity more than the amount prescribed in the following table:

Class of track	Tangent track	Curved track
	The deviation of the mid-offset from 62-foot line [1] may not be more than—	The deviation of the mid-ordinate from 62-foot chord [2] may not be more than—
1	5″	5″
2	3″	3″
3	1¾″	1¾″
4	1½″	1½″
5	¾″	⅝″
6	½″	⅜″

[1] The ends of the line must be at points on the gage side of the line rail, five-eighths of an inch below the top of the railhead. Either rail may be used as the line rail, however, the same rail must be used for the full length of that tangential segment of track.

[2] The ends of the chord must be at points on the gage side of the outer rail, five-eighths of an inch below the top of the railhead.

§ 213.57 Curves; elevation and speed limitations.

(a) Except as provided in § 213.63, the outside rail of a curve may not be lower than the inside rail or have more than 6 inches of elevation.

(b) The maximum allowable operating speed for each curve is determined by the following formula:

$$V_{max} = \sqrt{\frac{E_a + 3}{0.0007d}}$$

where

V_{max} = Maximum allowable operating speed (miles per hour).

E_a = Actual elevation of the outside rail (inches).

d = Degree of curvature (degrees).

Appendix A is a table of maximum allowable operating speed computed in accordance with this formula for various elevations and degrees of curvature.

§ 213.59 Elevation of curved track; runoff.

(a) If a curve is elevated, the full elevation must be provided throughout the curve, unless physical conditions do not permit. If elevation runoff occurs in a curve, the actual minimum elevation must be used in computing the maximum allowable operating speed for that curve under § 213.57(b).

(b) Elevation runoff must be at a uniform rate, within the limits of track surface deviation prescribed in § 213.63, and it must extend at least the full length of the spirals. If physical conditions do not permit a spiral long enough to accommodate the minimum length of runoff, part of the runoff may be on tangent track.

§ 213.61 Curve data for Classes 4 through 6 track.

(a) Each owner of track to which this part applies shall maintain a record of each curve in its Classes 4 through 6 track. The record must contain the following information:

(1) Location;

(2) Degree of curvature;

(3) Designated elevation;

(4) Designated length of elevation runoff; and

(5) Maximum allowable operating speed.

[38 FR 875, Jan. 5, 1973]

§ 213.63 Track surface.

Each owner of the track to which this part applies shall maintain the surface of its track within the limits prescribed in the following table:

Track surface	Class of track					
	1	2	3	4	5	6
The runoff in any 31 feet of rail at the end of a raise may not be more than	3½"	3"	2"	1½"	1"	½"
The deviation from uniform profile on either rail at the midordinate of a 62-foot chord may not be more than	3"	2¾"	2¼"	2"	1¼"	½"
Deviation from designated elevation on spirals may not be more than	1¾"	1½"	1¼"	1"	¾"	½"
ariation in cross level on spirals in any 31 feet may not be more than	2"	1¾"	1¼"	1"	¾"	½"
Deviation from zero cross level at any point on tangent or from designated elevation on curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	½"
The difference in cross level between any two points less than 62 feet apart on tangents and curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	¾"

Subpart D—Track Structure

§ 213.101 Scope.

This subpart prescribes minimum requirements for ballast, crossties, track assembly fittings, and the physical condition of rails.

§ 213.103 Ballast; general.

Unless it is otherwise structurally supported, all track must be supported by material which will—

(a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;

(b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;

(c) Provide adequate drainage for the track; and

(d) Maintain proper track cross-level, surface, and alinement.

§ 213.105 Ballast; disturbed track.

If track is disturbed, a person designated under § 213.7 shall examine the track to determine whether or not the ballast is sufficiently compacted to perform the functions described in § 213.103. If the person making the examination considers it to be necessary in the interest of safety, operating speed over the disturbed segment of track must be

reduced to a speed that he considers safe.

§ 213.109 Crossties.

(a) Crossties may be made of any material to which rails can be securely fastened. The material must be capable of holding the rails to gage within the limits prescribed in § 213.53(b) and distributing the load from the rails to the ballast section.

(b) A timber crosstie is considered to be defective when it is—

(1) Broken through;

(2) Split or otherwise impaired to the extent it will not hold spikes or will allow the ballast to work through;

(3) So deteriorated that the tie plate or base of rail can move laterally more than one-half inch relative to the crosstie;

(4) Cut by the tie plate through more than 40 percent of its thickness; or

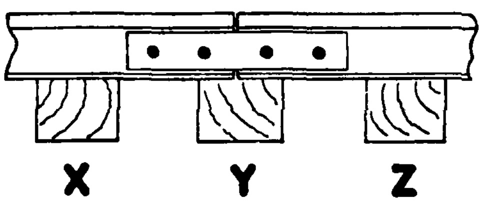
(5) Not spiked as required by § 213.127.

(c) If timber crossties are used, each 39 feet of track must be supported by nondefective ties as set forth in the following table:

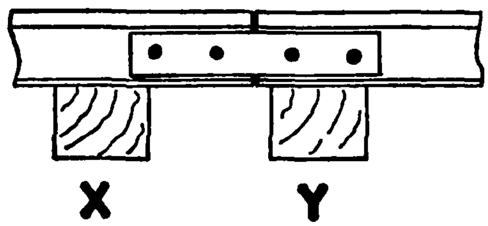
Class of track	Minimum number of nondefective ties per 39 feet of track	Maximum distance between nondefective ties (center to center) (inches)
1	5	100
2, 3	8	70
4, 5	12	48
6	14	48

(d) If timber ties are used, the minimum number of nondefective ties under a rail joint and their relative positions under the joint are described in the following chart. The letters in the chart correspond to letters underneath the ties for each type of joint depicted.

SUPPORTED JOINT



SUSPENDED JOINT



Class of track	Minimum number of nondefective ties under a joint	Required position of nondefective ties: Supported joint	Required position of nondefective ties: Suspended joint
1	1	X, Y, or Z	X or Y.
2, 3	1	Y	X or Y.
4, 5, 6	2	X and Y, or Y and Z.	X and Y.

(e) Except in an emergency or for a temporary installation of not more than 6-months duration, crossties may not be interlaced to take the place of switch ties.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973]

§ 213.113 Defective rails.

(a) When an owner of track to which this part applies learns, through inspection or otherwise, that a rail in that track contains any of the defects listed in the following table, a person designated under § 213.7 shall determine whether or not the track may continue in use. If he determines that the track may continue in use, operation over the defective rail is not permitted until—

(1) The rail is replaced; or

(2) The remedial action prescribed in the table is initiated:

Remedial Action

Defect	Length of defect (inch)		Percent of railhead cross-sectional area weakened by defect		If defective rail is not replaced, take the remedial action prescribed in note—
	More than	But not more than	Less than	But not less than	
Transverse fissure			20		B.
			100	20	B.
				100	A.
Compound fissure			20		B.
			100	20	B.
				100	A.
Detail fracture Engine burn fracture Defective weld			20		C.
			100	20	D.
				100	A, or E and H.
Horizontal split head Vertical split head	0	2			H and F.
	2	4			I and G.
	4				B.
	(Break out in railhead)				A.
Split web Piped rail Head web separation	0	½			H and F.
	½	3			I and G.
	3				B.
	(Break out in railhead)				A.
Bolt hole crack	0	½			H and F.
	½	1½			I and G.
	1½				B.
	(Break out in railhead)				A.
Broken base	0	6			E and I.
	6				(Replace rail).
Ordinary break					A or E.
Damaged rail					C.

NOTE:

A—Assign person designated under § 213.7 to visually supervise each operation over defective rail.
B—Limit operating speed to 10 m.p.h. over defective rail.
C—Apply joint bars bolted only through the outermost holes to defect within 20 days after it is determined to continue the track in use. In the case of classes 3 through 6 track, limit operating speed over defective rail to 30 m.p.h. until angle bars are applied; thereafter, limit speed to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
D—Apply joint bars bolted only through the outermost holes to defect within 10 days after it is determined to continue the track in use. Limit operating speed over defective rail to 10 m.p.h. until angle bars are applied; thereafter, limit speed to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
E—Apply joint bars to defect and bolt in accordance with § 213.121 (d) and (e).
F—Inspect rail 90 days after it is determined to continue the track in use.
G—Inspect rail 30 days after it is determined to continue the track in use.
H—Limit operating speed over defective rail to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
I—Limit operating speed over defective rail to 30 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

(b) If a rail in classes 3 through 6 track or class 2 track on which passenger trains operate evidences any of the conditions listed in the following table, the remedial action prescribed in the table must be taken:

Condition	Remedial action	
	If a person designated under § 213.7 determines that condition requires rail to be replaced	If a person designated under § 213.7 determines that condition does not require rail to be replaced
Shelly spots Head checks Engine burn (but not fracture). Mill defect	Limit speed to 20 m.p.h. and schedule the rail for replacement.	Inspect the rail for internal defects at intervals of not more than every 12 months.
Flaking Slivered Corrugated Corroded	do	Inspect the rail at intervals of not more than every 6 months.

(c) As used in this section—

(1) "Transverse Fissure" means a progressive crosswise fracture starting from a crystalline center or nucleus inside the head from which it spreads outward as a smooth, bright, or dark, round or oval surface substantially at a right angle to the length of the rail. The distinguishing features of a transverse fissure from other types of fractures or defects are the crystalline center or nucleus and the nearly smooth surface of the development which surrounds it.

(2) "Compound Fissure" means a progressive fracture originating in a horizontal split head which turns up or down in the head of the rail as a smooth, bright, or dark surface progressing until substantially at a right angle to the length of the rail. Compound fissures require examination of both faces of the fracture to locate the horizontal split head from which they originate.

(3) "Horizontal Split Head" means a horizontal progressive defect originating inside of the rail head, usually one-quarter inch or more below the running surface and progressing horizontally in all directions, and generally accompanied by a flat spot on the running surface. The defect appears as a crack lengthwise of the rail when it reaches the side of the rail head.

(4) "Vertical Split Head" means a vertical split through or near the middle of the head, and extending into or through it. A crack or rust streak may show under the head close to the web or pieces may be split off the side of the head.

(5) "Split Web" means a lengthwise crack along the side of the web and extending into or through it.

(6) "Piped Rail" means a vertical split in a rail, usually in the web, due to failure of the sides of the shrinkage cavity in the ingot to unite in rolling.

(7) "Broken Base" means any break in the base of a rail.

(8) "Detail Fracture" means a progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures, or other defects which have internal origins. Detail fractures may arise from shelly spots, head checks, or flaking.

(9) "Engine Burn Fracture" means a progressive fracture originating in spots where driving wheels have slipped on top of the rail head. In developing downward they frequently resemble the compound or even transverse fissure with which they should not be confused or classified.

(10) "Ordinary Break" means a partial or complete break in which there is no sign of a fissure, and in which none of the other defects described in this paragraph are found.

(11) "Damaged rail" means any rail broken or injured by wrecks, broken, flat, or unbalanced wheels, slipping, or similar causes.

(12) "Shelly spots" means a condition where a thin (usually three-eighths inch in depth or less) shell-like piece of surface metal becomes separated from the parent metal in the railhead, generally at the gage corner. It may be evidenced by a black spot appearing on the railhead over the zone of separation or a piece of metal breaking out completely, leaving a shallow cavity in the railhead. In the case of a small shell there may be no surface evidence, the existence of the shell being apparent only after the rail is broken or sectioned.

(13) "Head checks" mean hair fine cracks which appear in the gage corner of the rail head, at any angle with the length of the rail. When not readily visible the presence of the checks may often be detected by the raspy feeling of their sharp edges.

(14) "Flaking" means small shallow flakes of surface metal generally not more than one-quarter inch in length or width break out of the gage corner of the railhead.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973; 38 FR 1508, Jan. 15, 1973]

§ 213.115 Rail end mismatch.

Any mismatch of rails at joints may not be more than that prescribed by the following table:

Class of track	Any mismatch of rails at joints may not be more than the following—	
	On the trend of the rail ends (inch)	On the gage side of the rail ends (inch)
1	$\frac{1}{4}$	$\frac{1}{4}$
2	$\frac{1}{4}$	$\frac{3}{16}$
3	$\frac{3}{16}$	$\frac{3}{16}$
4, 5	$\frac{1}{8}$	$\frac{1}{8}$
6	$\frac{1}{8}$	$\frac{1}{8}$

§ 213.117 Rail end batter.

(a) Rail end batter is the depth of depression at one-half inch from the rail end. It is measured by placing an 18-inch straightedge on the tread on the rail end, without bridging the joint, and measuring the distance between the bottom of the straightedge and the top of the rail at one-half inch from the rail end.

(b) Rail end batter may not be more than that prescribed by the following table:

Class of track	*Rail end batter may not be more than— (inch)*
1	$\frac{1}{2}$
2	$\frac{3}{8}$
3	$\frac{3}{8}$
4	$\frac{1}{4}$
5	$\frac{1}{8}$
6	$\frac{1}{8}$

§ 213.119 Continuous welded rail.

(a) When continuous welded rail is being installed, it must be installed at, or adjusted for, a rail temperature range

that should not result in compressive or tensile forces that will produce lateral displacement of the track or pulling apart of rail ends or welds.

(b) After continuous welded rail has been installed it should not be disturbed at rail temperatures higher than its installation or adjusted installation temperature.

§ 213.121 Rail joints.

(a) Each rail joint, insulated joint, and compromise joint must be of the proper design and dimensions for the rail on which it is applied.

(b) If a joint bar on classes 3 through 6 track is cracked, broken, or because of wear allows vertical movement of either rail when all bolts are tight, it must be replaced.

(c) If a joint bar is cracked or broken between the middle two bolt holes it must be replaced.

(d) In the case of conventional jointed track, each rail must be bolted with at least two bolts at each joint in classes 2 through 6 track, and with at least one bolt in class 1 track.

(e) In the case of continuous welded rail track, each rail must be bolted with at least two bolts at each joint.

(f) Each joint bar must be held in position by track bolts tightened to allow the joint bar to firmly support the abutting rail ends and to allow longitudinal movement of the rail in the joint to accommodate expansion and contraction due to temperature variations. When out-of-face, no-slip, joint-to-rail contact exists by design, the requirements of this paragraph do not apply. Those locations are considered to be continuous welded rail track and must meet all the requirements for continuous welded rail track prescribed in this part.

(g) No rail or angle bar having a torch cut or burned bolt hole may be used in classes 3 through 6 track.

§ 213.123 Tie plates.

(a) In classes 3 through 6 track where timber crossties are in use there must be tie plates under the running rails on at least eight of any 10 consecutive ties.

(b) Tie plates having shoulders must be placed so that no part of the shoulder is under the base of the rail.

§ 213.125 Rail anchoring.

Longitudinal rail movement must be effectively controlled. If rail anchors which bear on the sides of ties are used for this purpose, they must be on the same side of the tie on both rails.

§ 213.127 Track spikes.

(a) When conventional track is used with timber ties and cut track spikes, the rails must be spiked to the ties with at least one line-holding spike on the gage side and one line-holding spike on the field side. The total number of track spikes per rail per tie, including plate-holding spikes, must be at least the number prescribed in the following table:

MINIMUM NUMBER OF TRACK SPIKES PER RAIL PER TIE, INCLUDING PLATE-HOLDING SPIKES

Class of track	Tangent track and curved track with not more than 2° of curvature	Curved track with more than 2° but not more than 4° of curvature	Curved track with more than 4° but not more than 6° of curvature	Curved track with more than 6° of curvature
1	2	2	2	2
2	2	2	2	3
3	2	2	2	3
4	2	2	3	----------
5	2	3	----------	----------
6	2	----------	----------	----------

(b) A tie that does not meet the requirements of paragraph (a) of this section is considered to be defective for the purposes of § 213.109(b).

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.129 Track shims.

(a) If track does not meet the geometric standards in Subpart C of this part and working of ballast is not possible due to weather or other natural conditions, track shims may be installed to correct the deficiencies. If shims are used, they must be removed and the track resurfaced as soon as weather and other natural conditions permit.

(b) When shims are used they must be—

(1) At least the size of the tie plate;

(2) Inserted directly on top of the tie, beneath the rail and tie plate;

(3) Spiked directly to the tie with spikes which penetrate the tie at least 4 inches.

(c) When a rail is shimmed more than 1½ inches, it must be securely braced on at least every third tie for the full length of the shimming.

(d) When a rail is shimmed more than 2 inches a combination of shims and 2-

inch or 4-inch planks, as the case may be, must be used with the shims on top of the planks.

§ 213.131 Planks used in shimming.

(a) Planks used in shimming must be at least as wide as the tie plates, but in no case less than 5½ inches wide. Whenever possible they must extend the full length of the tie. If a plank is shorter than the tie, it must be at least 3 feet long and its outer end must be flush with the end of the tie.

(b) When planks are used in shimming on uneven ties, or if the two rails being shimmed heave unevenly, additional shims may be placed between the ties and planks under the rails to compensate for the unevenness.

(c) Planks must be nailed to the ties with at least four 8-inch wire spikes. Before spiking the rails or shim braces, planks must be bored with ⅝-inch holes.

§ 213.133 Turnouts and track crossings generally.

(a) In turnouts and track crossings, the fastenings must be intact and maintained so as to keep the components securely in place. Also, each switch, frog, and guard rail must be kept free of obstructions that may interfere with the passage of wheels.

(b) Classes 4 through 6 track must be equipped with rail anchors through and on each side of track crossings and turnouts, to restrain rail movement affecting the position of switch points and frogs.

(c) Each flangeway at turnouts and track crossings must be at least 1½ inches wide.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.135 Switches.

(a) Each stock rail must be securely seated in switch plates, but care must be used to avoid canting the rail by overtightening the rail braces.

(b) Each switch point must fit its stock rail properly, with the switch stand in either of its closed positions to allow wheels to pass the switch point. Lateral and vertical movement of a stock rail in the switch plates or of a switch plate on a tie must not adversely affect the fit of the switch point to the stock rail.

(c) Each switch must be maintained so that the outer edge of the wheel tread cannot contact the gage side of the stock rail.

(d) The heel of each switch rail must be secure and the bolts in each heel must be kept tight.

(e) Each switch stand and connecting rod must be securely fastened and operable without excessive lost motion.

(f) Each throw lever must be maintained so that it cannot be operated with the lock or keeper in place.

(g) Each switch position indicator must be clearly visible at all times.

(h) Unusually chipped or worn switch points must be repaired or replaced. Metal flow must be removed to insure proper closure.

§ 213.137 Frogs.

(a) The flangeway depth measured from a plane across the wheel-bearing area of a frog on class 1 track may not be less than 1⅜ inches, or less than 1½ inches on classes 2 through 6 track.

(b) If a frog point is chipped, broken, or worn more than five-eighths inch down and 6 inches back, operating speed over that frog may not be more than 10 miles per hour.

(c) If the tread portion of a frog casting is worn down more than three-eighths inch below the original contour, operating speed over that frog may not be more than 10 miles per hour.

§ 213.139 Spring rail frogs.

(a) The outer edge of a wheel tread may not contact the gage side of a spring wing rail.

(b) The toe of each wing rail must be solidly tamped and fully and tightly bolted.

(c) Each frog with a bolt hole defect or head-web separation must be replaced.

(d) Each spring must have a tension sufficient to hold the wing rail against the point rail.

(e) The clearance between the hold-down housing and the horn may not be more than one-fourth of an inch.

§ 213.141 Self-guarded frogs.

(a) The raised guard on a self-guarded frog may not be worn more than three-eighths of an inch.

(b) If repairs are made to a self-guarded frog without removing it from service, the guarding face must be restored before rebuilding the point.

§ 213.143 Frog guard rails and guard faces; gage.

The guard check and guard face gages in frogs must be within the limits prescribed in the following table:

Class of track	Guard check gage: The distance between the gage line of a frog to the guard line [1] of its guard rail or guarding face, measured across the track at right angles to the gage line, [2] may not be less than—	Guard face gage: The distance between guard lines, [1] measured across the track at right angles to the gage line, [2] may not be more than—
1	4′ 6⅛″	4′ 5¼″
2	4′ 6¼″	4′ 5⅛″
3, 4	4′ 6⅜″	4′ 5⅛″
5, 6	4′ 6½″	4′ 5″

[1] A line along that side of the flangeway which is nearer to the center of the track and at the same elevation as the gage line.

[2] A line ⅝ inch below the top of the center line of the head of the running rail, or corresponding location of the tread portion of the track structure.

Subpart E—Track Appliances and Track-Related Devices

§ 213.201 Scope.

This subpart prescribes minimum requirements for certain track appliances and track-related devices.

§ 213.205 Derails.

(a) Each derail must be clearly visible. When in a locked position a derail must be free of any lost motion which would allow it to be operated without removing the lock.

(b) When the lever of a remotely controlled derail is operated and latched it must actuate the derail.

§ 213.207 Switch heaters.

The operation of a switch heater must not interfere with the proper operation of the switch or otherwise jeopardize the safety of railroad equipment.

Subpart F—Inspection

§ 213.231 Scope.

This subpart prescribes requirements for the frequency and manner of inspecting track to detect deviations from the standards prescribed in this part.

§ 213.233 Track inspections.

(a) All track must be inspected in accordance with the schedule prescribed in paragraph (c) of this section by a person designated under § 213.7.

(b) Each inspection must be made on foot or by riding over the track in a vehicle at a speed that allows the person making the inspection to visually inspect the track structure for compliance with this part. However, mechanical or electrical inspection devices approved by the Federal Railroad Administrator may be used to supplement visual inspection. If a vehicle is used for visual inspection, the speed of the vehicle may not be more than 5 miles per hour when passing over track crossings, highway crossings, or switches.

(c) Each track inspection must be made in accordance with the following schedule:

Class of track	Type of track	Required frequency
1, 2, 3	Main track and sidings.	*Weekly* with at least 3 calendar days interval between inspections, or *before use*, if the track is used less than once a week, or *twice weekly* with at least 1 calendar day interval between inspections, if the track carries passenger trains or more than 10 million gross tons of traffic during the preceding calendar year.
1, 2, 3	Other than main track and sidings.	*Monthly* with at least 20 calendar days interval between inspections.
4, 5, 6		*Twice weekly* with at least 1 calendar day interval between inspections.

(d) If the person making the inspection finds a deviation from the requirements of this part, he shall immediately initiate remedial action.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.235 Switch and track crossing inspections.

(a) Except as provided in paragraph (b) of this section, each switch and track crossing must be inspected on foot at least monthly.

(b) In the case of track that is used less than once a month, each switch and track crossing must be inspected on foot before it is used.

§ 213.237 Inspection of rail.

(a) In addition to the track inspections required by § 213.233, at least once a

year a continuous search for internal defects must be made of all jointed and welded rails in Classes 4 through 6 track, and Class 3 track over which passenger trains operate. However, in the case of a new rail, if before installation or within 6 months thereafter it is inductively or ultrasonically inspected over its entire length and all defects are removed, the next continuous search for internal defects need not be made until 3 years after that inspection.

(b) Inspection equipment must be capable of detecting defects between joint bars, in the area enclosed by joint bars.

(c) Each defective rail must be marked with a highly visible marking on both sides of the web and base.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.239 Special inspections.

In the event of fire, flood, severe storm, or other occurrence which might have damaged track structure, a special inspection must be made of the track involved as soon as possible after the occurrence.

§ 213.241 *Inspection records.*

(a) Each owner of track to which this part applies shall keep a record of each inspection required to be performed on that track under this subpart.

(b) Each record of an inspection under §§ 213.233 and 213.235 shall be prepared on the day the inspection is made and signed by the person making the inspection. Records must specify the track inspected, date of inspection, location and nature of any deviation from the requirements of this part, and the remedial action taken by the person making the inspection. The owner shall retain each record at its division headquarters for at least 1 year after the inspection covered by the record.

(c) Rail inspection records must specify the date of inspection, the location, and nature of any internal rail defects found, and the remedial action taken and the date thereof. The owner shall retain a rail inspection record for at least 2 years after the inspection and for 1 year after remedial action is taken.

(d) Each owner required to keep inspection records under this section shall make those records available for inspection and copying by the Federal Railroad Administrator.

Appendix A—Maximum Allowable Operating Speeds for Curved Track

Degree of Curvature	Elevation of outer rail (inches)												
	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
	Maximum allowable operating speed (mph)												
0°30′	93	100	107										
0°40′	80	87	93	98	103	109							
0°50′	72	78	83	88	93	97	101	106	110				
1°00′	66	71	76	80	85	89	93	96	100	104	107	110	
1°15′	59	63	68	72	76	79	83	86	89	93	96	99	101
1°30′	54	58	62	66	69	72	76	79	82	85	87	90	93
1°45′	50	54	57	61	64	67	70	73	76	78	81	83	86
2°00′	46	50	54	57	60	63	66	68	71	73	76	78	80
2°15′	44	47	50	54	56	59	62	64	67	69	71	74	76
2°30′	41	45	48	51	54	56	59	61	63	66	68	70	72
2°45′	40	43	46	48	51	54	56	58	60	62	65	66	68
3°00′	38	41	44	46	49	51	54	56	58	60	62	64	66
3°15′	36	39	42	45	47	49	51	54	56	57	59	61	63
3°30′	35	38	40	43	45	47	50	52	54	55	57	59	61
3°45′	34	37	39	41	44	46	48	50	52	54	55	57	59
4°00′	33	35	38	40	42	44	46	48	50	52	54	55	57
4°30′	31	33	36	38	40	42	44	45	47	4	50	52	54
5°00′	29	32	34	36	38	40	41	43	45	46	48	49	51
5°30′	28	30	32	34	36	38	40	41	43	44	46	47	48
6°00′	27	29	31	33	35	36	38	39	41	42	44	45	46
6°30′	26	28	30	31	33	35	36	38	39	41	42	43	45
7°00′	25	27	29	30	32	34	35	36	38	39	40	42	43
8°00′	23	25	27	28	30	31	33	34	35	37	38	39	40
9°00′	22	24	25	27	28	30	31	32	33	35	36	37	38
10°00′	21	22	24	25	27	28	29	31	32	33	34	35	36
11°00′	20	21	23	24	26	27	28	29	30	31	32	33	34
12°00′	19	20	22	23	24	26	27	28	29	30	31	32	3

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

APPENDIX B

PROPOSED RAIL OUTLOADING PROCEDURE FOR A MOBILIZATION MOVE AT CAMP RIPLEY

Maximum rail outloading operations use a cyclic schedule to minimize conflicts and improve control. The recommended rail outloading plan, Plan 4, for Camp Ripley and the BNRR main line trackage serving Camp Ripley is included in figure 23. Plan 4 requires that approximately 206 railcars (106 from Camp Ripley and 100 from the BNRR main line track) be outloaded per day.

The simulation begins with the assumption that it takes several days to accumulate the necessary number of railcars to start full-scale outloading operations. Locomotives position the arriving cars at the designated loadout sites according to a preconceived plan. Simultaneously, the equipment to be loaded aboard the cars is prepared and staged. Personnel should be used to throw switches and act as road guards at all rail/highway crossings to reduce delays and insure a safer operation. The particular outloading scheme for Camp Ripley follows. The times required for various railcar switching operations are shown in table 10.

The cycle starts when loading begins at daylight, which is defined as zero hour. Loading and securing tiedowns or blocking and bracing will be completed within 7 hours, during daylight hours. The railcar switching operations will follow and must be finished in 17 hours so that the next cycle can begin the next day. That is, the loaded cars must be removed, assembled into trains, and sent toward their destination, and empty cars must be placed at the loading sites before daylight the next morning.

The switching sequence begins at the conclusion of blocking and bracing and inspection, which is 7 hours elapsed time after the cycle began. Four 120-ton locomotives couple with 50 loaded cars at loading site L5, on the BNRR track main line at the entrance to Camp Ripley. The temporary end-loading ramp placed there has been removed and the 50 loaded cars are pushed northward up the main line until they couple with the 50 loaded cars at site L4. Site L4 is a loading site consisting of a temporary end-loading ramp, placed on the main line, approximately 6,400 feet north of the switch, at the north leg of the Camp Ripley wye. The train of 100 loaded railcars departs for Little Falls, picks up its caboose, and thence leaves for the POE. As soon as this train clears the main line that leads from Little Falls to Camp Ripley, the second group of four 120-ton locomotives proceeds to loading site L3, along Bettenberg Avenue, where they couple with seven boxcars. These cars are pushed westward until they couple

ELAPSED TIME (HOURS) 7 8

LEGEND	
C	COUPLE
UC	UNCOUPLE
TR	TRANSIT
L	LOADED
MN	MAINLINE
WT	WAIT
SB	SET BRAKE
RB	RELEASE BRAKES
$\boxed{20}$	EMPTY CARS
SL	SWITCHING LOCOMOTIVE
ML	MAINLINE LOCOMOTIVE
FLT	FLAT CAR
BOX	BOX CAR
E	EMPTY

4-120 TON LOCOMOTIVES			
	OPERATION	C-50-L RB	TR
	TIME(MINUTES)	(50)	(10)
	TRACK LOCATION	L5	L4
	NO. OF RAILCARS	50	50

TRACK CAPACITY IN NO OF RAILCARS	LOADING SITES LISTED BY PRIORITY OF USE	TRACK NUMBER	NUMBER OF CARS
49	SOUTH SPUR	L1	49 FLT
57	NORTH SPUR	L2	50 FLT
26	BETTENBURG AVE	L3	7 BOX
106	BNRR MAINLINE	L4	50 FLT
100+	BNRR MAINLINE	L5	50 FLT

8 9

TR	C-50-L RB	TR
(10)	(50)	(21)
L4	L4	LITTLE FALLS
50	100	100

1ST TRAIN OF LOADED CARS ARRIVES LITTLE FALLS CLASSIFICATION YARD, PICKS-UP CABOOSE AND DEPARTS FOR POE. 5 LOCOMOTIVES DEPART FOR CAMP RIPLEY TO PICK-UP 2ND TRAIN.

4-120 TON LOCOMOTIVES	OPERATION	TR	C-7-L-RB	TR	
	TIME (MINUTES)	(21)	(7)	(3)	
	TRACK LOCATION	CAMP RIPLEY L3	L3	L2	
	NO. OF RAILCARS	0	7	7	

0

0

10

11

IVES
D,
FOR
CAMP

3-120 TON LOCOMOTIVES 106 EMPTIES	OPERATION
	TIME(MINUTE
	TRACK LOCAT
	NO. OF RAILCA

C-50-L RB	TR	C-49-L RB	TR
(50)	(15)	(49)	(23)
L2	L1	L1	LITTLE FALLS
57	57	106	106

0

0

Figure 2

3

12 13

OPERATION	TR	UC-49-E SB
TIME (MINUTES)	(25)	(54)
TRACK LOCATION	L1	L1
NO. OF RAILCARS	106	57

TR	
(23)	
LE FALLS	
106	

2ND TRAIN OF LOADED CARS ARRIVES AT LITTLE FALLS CLASSIFICATION YARD, PICKS UP CABOOSE AND DEPARTS FOR POE. 3 LOCOMOTIVES DEPART FOR CAMP RIPLEY WITH 106 EMPTY RAILCARS.

L1
L2
L3
L4
L5

Figure 23. Rail outloading simulation, Camp Ripley.

14

	TR	UC-57-E SB (50)	TR
	(9)	55	(30)
	L2	L2	LITTLE FALLS
	57	0	0

2-120 TON LOCOMOTIVES 50 EMPTIES	OPERATION	
	TIME(MINUTES)	
	TRACK LOCATION	
	NO. OF RAILCARS	

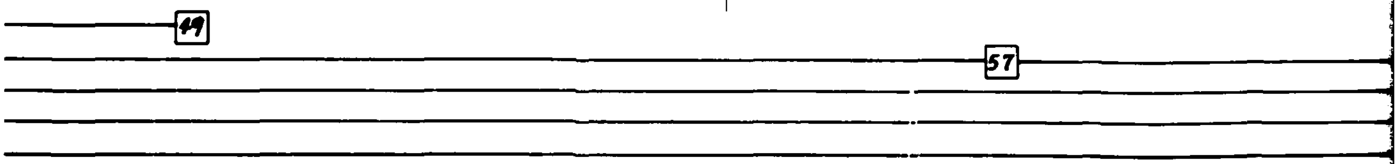


Figure 23. Continued.

15

16

2 -120 TON LOCOMOTIVES 50 EMPTIES	OPERATION
	TIME(MINUTES)
	TRACK LOCATION
	NO. OF RAILCARS

ON	TR	UC-50-E SB	TR
NUTES)	(32)	(55)	(30)
OCATION	L4	L4	LITTLE FALLS
ILCARS	50	0	0

50

17 18

[illegible]	[illegible]	C 7-E	TR	UC 7-E SB	TR	UC-50-E SB
[illegible]	[illegible]	(10)	(8)	(12)	(28)	(55)
[illegible]	[illegible]	L2	L3	L3	L5	L5
[illegible]	[illegible]	57	57	50	50	0

$\boxed{50}$

$\boxed{7}$

19

20

50-E SB	TR
(55)	(30)
15	LITTLE FALLS
0	0

50

TABLE 10
TIMES REQUIRED FOR VARIOUS RAILCAR SWITCHING
OPERATIONS AND LOCOMOTIVE CAPABILITY

<u>Empty</u>

C-15-E (5 min)
C-30-E (10 min)
C-45-E (15 min)
UC-15-E (1-2 min)
UC-15-E (SB) (15 min)
UC-30-E (SB) (30 min)

<u>Loaded</u>

C-15-L (5 min)
C-30-L (10 min)
C-45-L (15 min)
But if cars have been sitting overnight brakes must be checked
C-15-L (RB) (15 min)
C-30-L (RB) (30 min) (or 15 min for 2 men)
C-45-L (RB) (45 min) (or 15 min for 3 men)
UC-15-L (1-2 min)
UC-15-L (SB) (15 min)
UC-30-L (SB) (30 min)

C = Couple
UC = Uncouple
E = Empty
L = Loaded
SB = Set Brakes
Set brakes if cars are to be left overnight or loaded or on a steep grade.
RB = Release Brakes
UC-15-E(SB) = Uncouple 15 empty railcars, set brakes.

Note:
Above times are for daylight operations, add 5 minutes for night operations if brakes have to be set or checked.

<u>TRANSIT SPEED</u>

Average for all switching operations, 5 miles per hour. Engine with no railcars, 10 miles per hour for distances of one-half mile or more (except for night time then add 5 minutes for each transit).

<u>LOCOMOTIVE CAPABILITY</u>

120-ton locomotive-- 1200 tons on 2.5% grade
Empties--34 cars
Loaded--24 cars
2 M-60 tanks on series 38 car, 9 cars per locomotive
16 cars per locomotive with 1 tank per car
2 locomotives--2 times above capabilities

<u>Speed vs Time</u>

@5 miles per hour = .00227 min/ft
@10 miles per hour = .00114 min/ft
@26 miles per hour = .000438 min/ft

with the 50 loaded cars at site L2. The train of 57 cars reverses direction, backing the cars eastward until the last car clears the switch to loading site L1. The train stops, reverses, and then pushes the 57 cars onto track L1 until they couple with the 49 cars already there, making a train of 106 loaded cars. This train proceeds to Little Falls, picks up its caboose, and departs for the POE. A total of 206 loaded cars have been removed from Camp Ripley and are en route to the POE (total elapsed time--12 hours).

Now the loading sites must be filled with empty cars for the next day's work. As soon as the second train of loaded cars clears the track to Camp Ripley, the first train of 106 empties departs from Little Falls. (For the boxcars to be positioned at Camp Ripley at the correct loading site they should be adjacent to the locomotives in the train leaving Little Falls.) The train proceeds north up the main line until the last car clears the switch of the north leg of the wye leading into Camp Ripley. The train then backs through the north leg of the wye and onto loading site L1, where 49 cars are positioned with their brakes set for loading. The train reverses direction until the switch at L1/L2 is cleared, then pushes the remaining 57 cars onto L2. The brakes are set on the 50 flatcars; the boxcars are left temporarily so that sufficient track will be available along Bettenberg Avenue for placing the empties at loading sites L4 and L5. The locomotives return to Little Falls. As soon as they clear the track to Little Falls the second train, consisting of 50 empty flatcars, departs for Camp Ripley. The train heads north to the south leg of the wye, proceeds westward onto L3 loading site, reverses direction and pushes the cars through the north leg of the wye northward and into position at loading site L4. The brakes are set and the locomotives proceed south to Little Falls. As soon as they clear the track to Camp Ripley, this cycle's third and last train of 50 empties, proceeds north to L2 at Camp Ripley. The locomotive in front couples with the seven boxcars left there by the first train of empties, reverse direction, pushing the 50 flatcars toward the north leg of the wye. The train stops at the L3 boxcar loading site, the seven boxcars are positioned, then the train pushes the 50 flatcars through the north leg of the wye. When the locomotives clear the switch at the main line, they proceed south pulling the 50 flatcars into position at loading site L5. This completes the cycle and the locomotives return to Little Falls. Total elapsed time for the entire cycle is 19 hours and 44 minutes.

APPENDIX C

SPECIAL-PURPOSE RAILCARS AND LOADING/UNLOADING PROCEDURES

Specially designed railcars, in particular those used for transporting vehicles, can greatly increase the speed and efficiency of a rail outloading operation. Bilevel and integral chain tiedown flatcars are the primary means of enhancing the loadout routine of most military vehicles. Bilevel railcars are best suited for the smaller vehicles, including 2-1/2-ton trucks. Although trilevel cars are in abundant supply, their relatively low deck clearances prohibit the movement of most military equipment and therefore, cannot be considered a significant resource.

The integral tiedown flatcars will accommodate larger vehicles, including tanks. Loading and securing equipment on these railcars can be accelerated to 15 minutes per vehicle, for small vehicles, versus approximately 45 minutes for blocking and bracing procedures used on standard-type railcars. Also, the BTTX 89-foot flatcar has a capacity of six 2-1/2-ton trucks, doubling the single level capacity. Thus, in speed and capacity, special-purpose railcars are an advantage worth investigating.

There are essentially five methods of loading/unloading multilevel railcars; they are:

1. The "K" loader of 463L aircraft cargo-loading system.

2. The forklift and pallet used in conjunction with a crane and/or ramp.

3. The crane and ramp combination.

4. Adjustable ramps.

5. Adjustable built-in ramp on multilevel railcars.

The procedures used with each of the above are described in detail in TM 55-625[6/], as are tiedown procedures.

As of 1970, more than 70 percent of DOD installations had no organic capability to load/unload multilevel railcars. No outloading plans should include the use of these railcars until a thorough investigation verifies

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6/ TM 55-625, Transportability Criteria and Guidance, Loading and Unloading Multilevel Railcars at Military Installations in the United States.

their availability at the time required. The supply of special-purpose flatcars with integral tiedowns is also limited. As a result, even though these types of railcars are very valuable for volume rail outloading operations, their availability is seriously in question unless advance preparations are made.

The following trends in flatcar supply are now operative and have been since the development of modern piggyback service in the mid-1950's:

1. The size of the flatcar fleet has been growing, both in number of flatcars and in relation to the size of the car fleet as a whole. This gain has been confined to specialized cars; for example, trailer-on-flatcar, container-on-flatcar, bilevel, trilevel, and bulkhead flatcars.

2. The size of the general-purpose flatcar fleet has decreased, though average length and capacity have increased.

3. A majority of all flatcars are owned by car companies, not by the railroads. Therefore, more flexibility in assignment, with improved utilization, has resulted. Fewer idle cars are available for short-notice use than would be if each railroad maintained an adequate supply for its own needs.

Considering these trends, the sizes of the various components of the specialized flatcar fleet, and the blocking and bracing requirements for the various types of equipment to be shipped by rail, it does not appear prudent to express an installation's needs and outloading plan using only general-purpose flats. The TOFC fleet, in particular, is now most likely large enough to fill military requirements (table 11). The COFC fleet also has expanded to the point that it could carry most of the military's container movements, especially since COFC cars are used almost exclusively for import/export movements, which likely would be greatly disrupted in a mobilization period.

Accordingly, vans or containers should be outloaded on TOFC cars. If the movement is to a port for ocean shipment by other than RORO vessel, the use of COFC cars should be considered. However, the availability of COFC cars in the quantity desired without disrupting civilian container movements is highly improbable.

Other cars in the specialized flatcar fleet generally are assigned to specific services or to a carpool for one shipper's exclusive use. Therefore, although these cars can save blocking and bracing and should be requested when they can be employed profitably in a specific move, the likelihood of obtaining the cars is too weak to base outloading requirement on their use.

TABLE 11

TRAILER TRAIN COMPANY FLEET

Trailer Train Company ownership of selected car types as contained in the January 1979 Official Equipment Register. Trailer Train owns in excess of 95 percent of total US ownership of TOFC, C autorack cars.

Type	Reporting Marks	Quantity	
Flatcars with special equipment. See Legend	ATTX	303	
	FTTX	1,839	
	HTTX	763	
	ITTX	1,164	
	JTTX	2,474	
	MTTX	1,239	
	OTTX	2,519	
	PTTX	926	
	TTDX	222	
	TTHX	391	
	TTJX	205	
	TTMX	21	
	TTPX	1,426	
	ZTTX	72	
		13,564	
TOFC	TTX	28,908	
	TTAX	6,874	(see also COFC)
	GTTX	2,251	
	LTTX	2,027	
	XTTX	702	
		40,762	
COFC	TTAX	6,874	(see also TOFC)
	TTCX	699	
		7,573	
Bilevels	BTTX	1,882	
	TTBX	5,720	
	TTGX	1,002	
	TTSX	8	
		8,612	
Trilevels	CTTX	1,002	
	ETTX	5,034	
	KTTX	1,160	
	RTTX	2,540	
	TTKX	6,703	
	TTRX	2,696	
		19,135	

Legend - Definitions of Trailer Train Company's reporting marks

ATTX - Flatcars, equipped with two continuous tiedown loops on center sills, continuous tiedown each side, and bridgeplates. Not equipped with hitches, chains, jacks, and so forth.

BTTX - Flatcars equipped with bilevel autoracks, furnished by participant railroads.

CTTX - Flatcars equipped with coverless inclosed trilevel autoracks, furnished by participant ra

ETTX - Flatcars equipped with fully inclosed trilevel autoracks, furnished by participant railro

FTTX - Flatcars equipped with tiedown devices for loading automobile or truck frames.

GTTX - Flatcars equipped with hitches and bridgeplates for transporting trailers. Cars built by American Transportation Corporation.

HTTX - Flatcars equipped with 38 heavy-duty chains, with snubbers and turnbuckles, each secured and retractable tiedown winches in 4 longitudinal channels for transporting large, earth equipment.

ITTX - Flatcars equipped with end pedestals, and 62 tiedown winches with chains and bridgeplates [illegible] trailer tractors saddleback style.

'9 Official Railway
of TOFC, COFC, and

ılso COFC)

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HTTX - Flatcars equipped with 38 heavy-duty chains, with snubbers and turnbuckles, each secured to
and retractable tiedown winches in 4 longitudinal channels for transporting large, earth mov
equipment.

ITTX - Flatcars equipped with end pedestals, and 62 tiedown winches with chains and bridgeplates, f
transporting trailer tractors saddleback style.

JTTX - Flatcars specially modified or equipped by participant railroads with miscellaneous devices
special services.

KTTX - Flatcars equipped with hinged-end trilevel autoracks, furnished by participant railroads.

LTTX - Low-deck flatcars equipped with hitches and bridgeplates.

MTTX - Sixty-ft flatcars with stake pockets and lading strap anchors for general service, or 85-ft
flatcars with 16 stake pockets, 8 per side, for transporting long pipe.

OTTX - Flatcars equipped with 64 chains, with snubbers, each secured to movable and retractable tie
winches in 4 longitudinal channels, for transporting agricultural equipment.

PTTX - Flatcars equipped with bulkheads, spaced 48 ft 6 in. apart, for transporting plywood, wallbo
and so forth.

RTTX - Flatcars equipped with fixed trilevel autoracks, furnished by participant railroads.

TTAX - Flush deck flatcars equipped with movable foldaway container pedestals, knockdown hitches, a
bridgeplates, for transporting trailers or containers or combinations of both.

TTBX - Flatcars equipped with bilevel autoracks, furnished by participant railroads.

TTCX - Flush deck flatcars equipped with movable foldaway container pedestals for transporting cont

TTDX - Flatcars equipped with 16 tiedown winches with chains and bridgeplates, for transporting
military vehicles semi-saddleback style.

TTGX - Flatcars equipped with fully inclosed bilevel autoracks, furnished by participant railroads.

TTHX - Flatcars equipped with heavy-duty chains anchored to removable stake pocket castings. When
downs are removed, car becomes same as 60-ft cars stencilled "MTTX."

TTJX - Sixty-eight-ft, 90-ton flatcars with special tiedown devices, fixtures, and stake pockets.

TTKX - Flatcars equipped with hinged-end trilevel autoracks, furnished by participant railroads.

TTMX - Sixty-eight-ft, 100-ton flatcars with stake pockets and lading strap anchors for general ser

TTPX - Flatcars equipped with bulkheads spaced 62 ft 0 in. apart and 17 transverse tiedown anchors
chains, used for transporting wallboard, plywood, and so forth.

TTRX - Flatcars equipped with fixed trilevel autoracks, furnished by participant railroads.

TTSX - Flatcars equipped with coverless inclosed bilevel autoracks, furnished by participant railro

TTVX - Flatcars equipped with Vert-A-Pak superstructure, furnished by participant railroads.

TTX - Flatcars equipped with hitches and bridgeplates for transporting trailers. See Note 1.

XTTX - Flatcars equipped with four hitches and bridgeplates for transporting two trailers, one
45-ft and one 40-ft, or three 28-ft trailers.

ZTTX - Flatcars equipped with 30 stake pockets, 15 per side, for transporting long poles.

Note 1 - TTX 105-109 are specially equipped, multihitch instruction cars, not suitable for revenue
service. For disposition or further information on these cars, contact Mr. M. B. Flagg, M
Inspection and Training, Trailer Train Company, 300 So. Wacker Dr., Chicago, IL 60606.

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Factors affecting the use of specialized flatcars include:

1. First priority for use of general-purpose flats should be to load tracked vehicles and nonstandard wheeled vehicles; for example, artillery.

2. First priority for requesting specialized flats should be for TOFC and COFC cars to load vans and containers, which require very extensive blocking and bracing to move on general-purpose cars.

3. TOFC and COFC cars require no blocking and bracing.

4. Bilevel and trilevel flats will require heavier chains and possibly different hooks to handle other than commercial specification vehicles. Due to the problem of close clearance on trilevel cars, emphasis on vehicle outloading should be placed on bilevel and flatcars.

5. Chain tiedown flats may require heavier chains, depending on the loads for which they were designed.

6. Where TOFC cars must be loaded using a ramp rather than side or overhead loading, the number of cars at a ramp should be limited to about 10 because of the delay involved in backing the trailers down the length of the cars and returning with the tractor.

7. Where sufficient suitable aprons and MHE are available, it may be desirable to load containers directly onto COFC cars rather than to place them on bogies and use TOFC cars.

8. If COFC or TOFC cars are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars to carry containers.

9. Bilevel and trilevel cars require, obviously, bilevel and trilevel ramps or other equipment as indicated in TM 55-625.

10. TOFC, COFC, bilevel, and trilevel cars average 89 feet long. TOFC cars can handle two 40-foot trailers or one 40-foot and one 45-foot trailer. COFC cars can handle four 20-foot container equivalents. Autorack cars can accommodate four to seven vehicle per deck, depending on vehicle length and the number of tiedown chain sets.

11. Tracks used to store or load cars 89 feet long should be reachable without going through curves exceeding 14-degree curvature, and tracks used for cars between 55 and 65 feet should be reachable without going through curves exceeding 15-degree curvature.

APPENDIX D

DEPARTMENT OF TRANSPORTATION — FEDERAL RAILROAD ADMINISTRATION, CAMP RIPLEY TRACK INSPECTION REPORT

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
456 Federal Bldg. ' U. S. Courthouse
110 South 4th Street
Minneapolis, Minnesota 55401

June 18, 1979

Mr. John Grier, MTMC-TEA
12388 Warick Blvd.
P. O. Box 6276
Newport News, Virginia 23606

Dear Mr. Grier:

Please find below a description of deviations noted in our walking inspection of trackage within the confines of Camp Ripley conducted on June 4, 1979, on which we were accompanied by Camp Engineer, Col. Wilcjek. The defects are listed according to the sequence of inspection.

North track within the compound west of unloading track switch the following defects were noted.

1 location of tight gage measured 55-3/4 inches
1 loose joint
10 locations of missing bolts

Rail in this track is 72 lb. secured by 11/16 inch bolts in 4 hole bars, single shoulder tie plates and 2 rail holding spikes.

South track within the compound west of unloading track switch the following defects were noted.

3 locations of tight gage measured 55-3/4 inches due to slued ties
4 cracked or broken joint bars
4 locations of missing bolts
1 broken rail horizontal split web
2 locations of worn joint bars
1 location of wide gage

The rail is 66.02 lb. secured with 4 hole joint bars, single shoulder tie plates and 2 rail holding spikes.

The single track between unloading track switch and west wye switch had the following defects.

3 locations of bolts missing
1 location of defective ties measured 76 inches
2 locations of tight gage
1 location of open switch point 1/4 inch

Rail is 72 lb. secured by 11/16 inch bolts, 4 hole joint bars, single shoulder tie plates, 2 rail holding spikes.

The track between west wye switch and south wye switch on the Burlington Northern is referred to as south leg of the wye.

3 locations of tight gage - 2 measured 55-3/4 inches,
1 measured 55-1/2 inches
2 locations of loose joints
2 locations of bolts missing
1 location of worn joint bars

Rail is 72 lb. secured by 11/16 inch bolts, 4 hole joint bars, single shoulder tie plates, 2 rail holding spikes.

The track between west wye switch and north wye switch on the Burlington Northern is referred to as north leg of the wye.

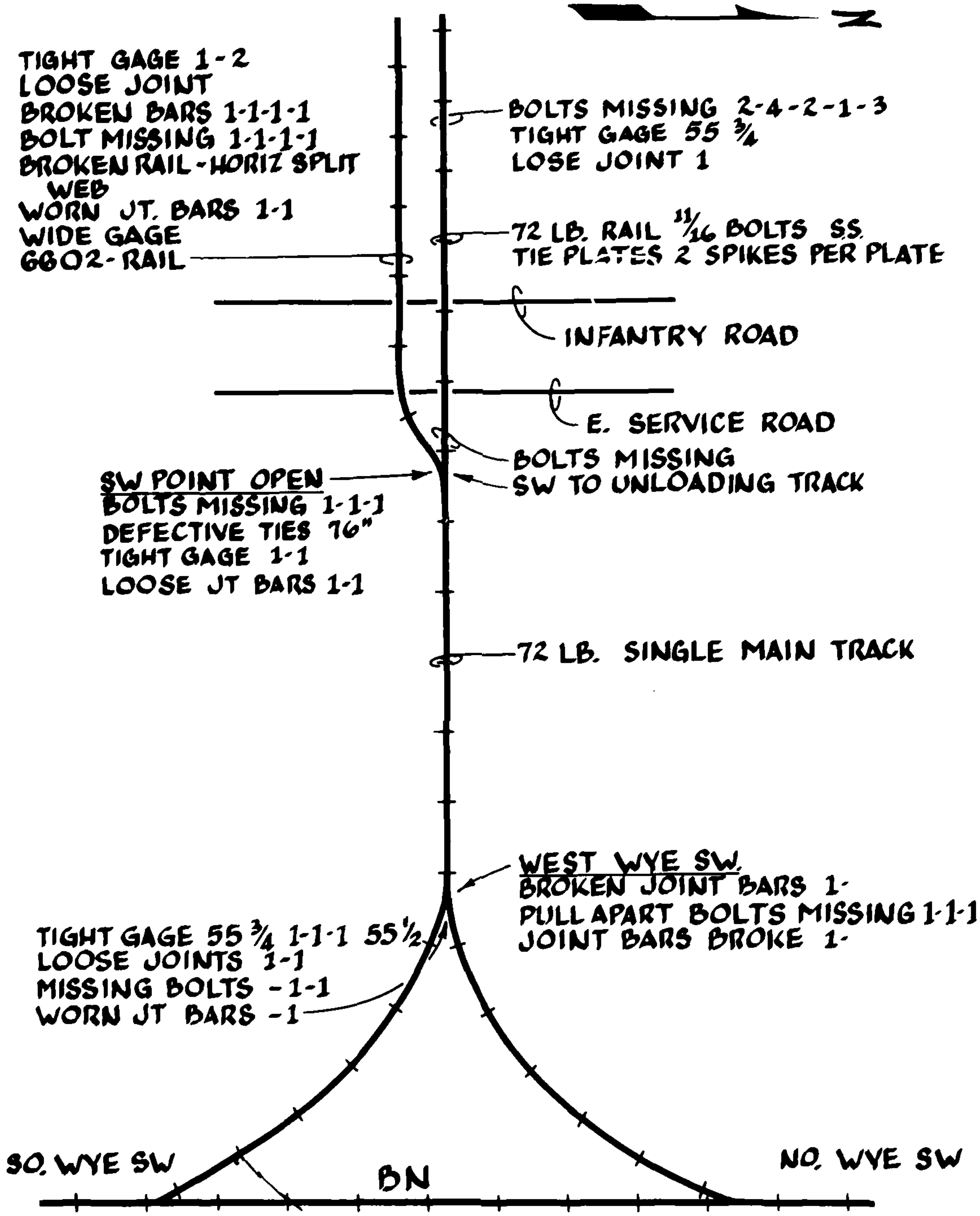
2 locations broken joint bar
3 locations bolts missing

Rail is 72 lb. secured by 11/16 inch bolts, 4 hole joint bars, single shoulder tie plates, 2 rail holding spikes. Surface, in general, is good over entire trackage. Although ties appear sound many are deteriorated on the underside as tapping ties disclosed hollow sound indicative of internal deterioration. Trackage after reported maintenance completion will meet or exceed Class #2 standards.

Sincerely yours,

W. Ginkel
Track Inspector, FRA

cc: J. J. Sharpe



INSPECTION JUNE 4, 1979

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